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**Regression Periods in infancy and  
maternal post-natal depression**

**Ashley Woolmore BSc (Hons.)**

**A thesis submitted in partial fulfilment  
of the requirements of the Open University  
for the degree of Doctor of Clinical Psychology**

**14 July 1998**

**The British Psychological Society**

**DATE OF AWARD: 15 SEPTEMBER 1998**

# Abstract

van de Rijt-Plooij & Plooij (1992) have found periods of 'regressive behaviour' (Regression Periods), which accompany developmental transitions in infancy. In full-term normal infants these periods occur at specific ages. The present study had two central aims. Firstly, to see if the Plooij's' finding of Regression Periods at 12, 17 and 26 weeks postpartum could be replicated. Secondly, to investigate the relationship between the length of Regression Periods for a control group of participants and a group of participants at heightened risk of developing insecure mother-infant attachment: mothers presenting with symptoms of post-natal depression. Forty-five mother-infant dyads participated in this prospective, longitudinal study. After seeing mothers at home, they were interviewed weekly, for approximately 15 weeks, about specific infant behaviours and their reactions to their infant. Following two types of manipulation of the data, Regression Periods for control group participants were detected at weeks 12, 16, 20 and 24, whereas for participants in the post-natal depression group, Regression Periods were detected at weeks 14, 17 and 25, supporting the Plooij's' findings. Regression Periods were longer in the post-natal depression group. Depressed mothers were also less flexible in their mothering style, measured on the Facilitators & Regulators questionnaire. Based on the findings of this study, the development of insecure attachment is discussed. A clinical implication of this work is that information about Regression Periods could be made available to new-mothers, using Regression Period knowledge to focus on the prevention of insecure attachment.

# Acknowledgements

I would like to take this opportunity to thank all the people involved in this project. I would particularly like to thank the mothers who participated in this study. Their enthusiasm, interest and reliability meant that following their babies' development was a pleasure.

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Finally, and most importantly, Murielle. During the ups and downs of this project you have always managed to say the right things. You've put up with never being able to use the phone; the hours, days, and months of me using you as a sounding board for ideas and you've provided me with reassurance. What would I have done without you?



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# 1. Introduction

This study presents an ambitious attempt to link three areas of research, which relate to infant development:

- Attachment Theory
- Regression Periods
- Maternal Post-natal Depression.

To set the clinical context, a brief overview of attachment theory and the sequelae of environmental factors in early infancy are presented. The introduction then continues with a detailed presentation of the work of van de Rijt-Plooij & Plooij (1992), and discusses the contribution of other researchers investigating the phenomenon of Regression Periods in infancy. The current study is a part-replication and extension of the work of van de Rijt-Plooij & Plooij (1992). The notion that Regression Periods can provide information on the developing mother-infant attachment is introduced and developed in the second section, where attachment theory is returned to and discussed in its theoretical context. Lastly, relevant research is presented on post-natal depression.

The introduction plots how this study was developed, the initial idea of investigating Regression Periods in the context of attachment, and the link with post-natal depression as a group at high risk of insecure attachment.

After the presentation of these topics a summary of the relevant research will be presented. The aims of the current study will be outlined and methodological issues discussed. The introduction ends with a presentation of the specific hypotheses.

### 1.1. The Clinical Context

Attachment theory is one of the most useful and fertile theories in child development (Richer, 1994). The original work focussing on categorisation of infant behaviour (Ainsworth & Wittig, 1969) has been very productive and has been followed by research that has focussed on internal representations of attachment relationships (Main, Kaplan & Cassidy, 1985). Attachment theory is powerful, and has applications in adult clinical work (Fonagy, Steele & Steele, 1991), family work and child clinical psychology (Murray & Cooper, 1994).

The sequelae of types of attachment have been investigated, and Belsky & Cassidy (1994) provide a useful review. They conclude that research that has focussed on the use of attachment classifications as a predictor of later problems, has not demonstrated any clear dysfunctional consequences of insecure attachment. On the other hand, the research that provides clear evidence of insecure attachment being a risk factor for later difficulties comes from studies of clinical populations. Here there is an over-representation of people with insecure attachment. The research shows that those who perform less well on standardised tasks of cognitive development, interact less well with teachers, have poorer interpersonal skills, and who are at heightened risk of developing behavioural problems and psychological disturbances, were infants with insecure attachments. An understanding of the factors which lead to insecure attachment and which offer potential avenues for averting the development of insecure attachment have clear benefits. The clinical import of this study lies in its attempt to discover how features of infant behaviour interact with environmental factors, specifically mothers' behaviour, to affect the development of secure or insecure mother-infant attachment.

### 1.2. The work of Hedwig van de Rijt-Plooij and Frans X. Plooij

In a series of articles, van de Rijt-Plooij and Plooij have documented their work on mother-infant interactions (van de Rijt Plooij & Plooij, 1987; 1992; 1993; Plooij & van de Rijt-Plooij,

1988). Initially, they studied free-living chimpanzees, using ethological methods. Their detailed longitudinal observations of chimpanzees revealed periods of sudden increases in closeness between mother and infant, which preceded 'behavioural re-organisations' (van de Rijt-Plooij & Plooij, 1987). The term 'behavioural re-organisation' is used to describe a transition in development, where one set of skills or behaviours are superseded by another developmentally more advanced set. They termed the periods of increased closeness to the mother, Regression Periods, which by definition are discrete periods of increased proximity seeking behaviour.

van de Rijt-Plooij and Plooij continued with their ethologically-based research but switched to human participants. Their key article on Regression Periods in human infants was published in 1992 (van de Rijt-Plooij & Plooij, 1992). In this study they sought to determine if Regression Periods could be detected in human infants. Fifteen mother-infant dyads participated in a prospective study, starting from the end of the first week after birth. The mothers were carefully selected to be as psychologically, financially and physically 'healthy' as possible.

Data were collected using two methods:

- **A weekly written questionnaire**, which focussed on easily observable infant behaviour and mother's reaction to her infant and its behaviour. The questionnaire also included a check-sheet so that for one day a week, the infant's mother could record the infant's whereabouts at half-hour intervals (e.g. if the infant had been in contact with her, in its playpen, or with other people). Mothers were given 80 questionnaires, one for each week of the infant's first 20 months. Mothers completed, then sent back the questionnaires to the researchers each week. The researchers contacted the mothers if the information from

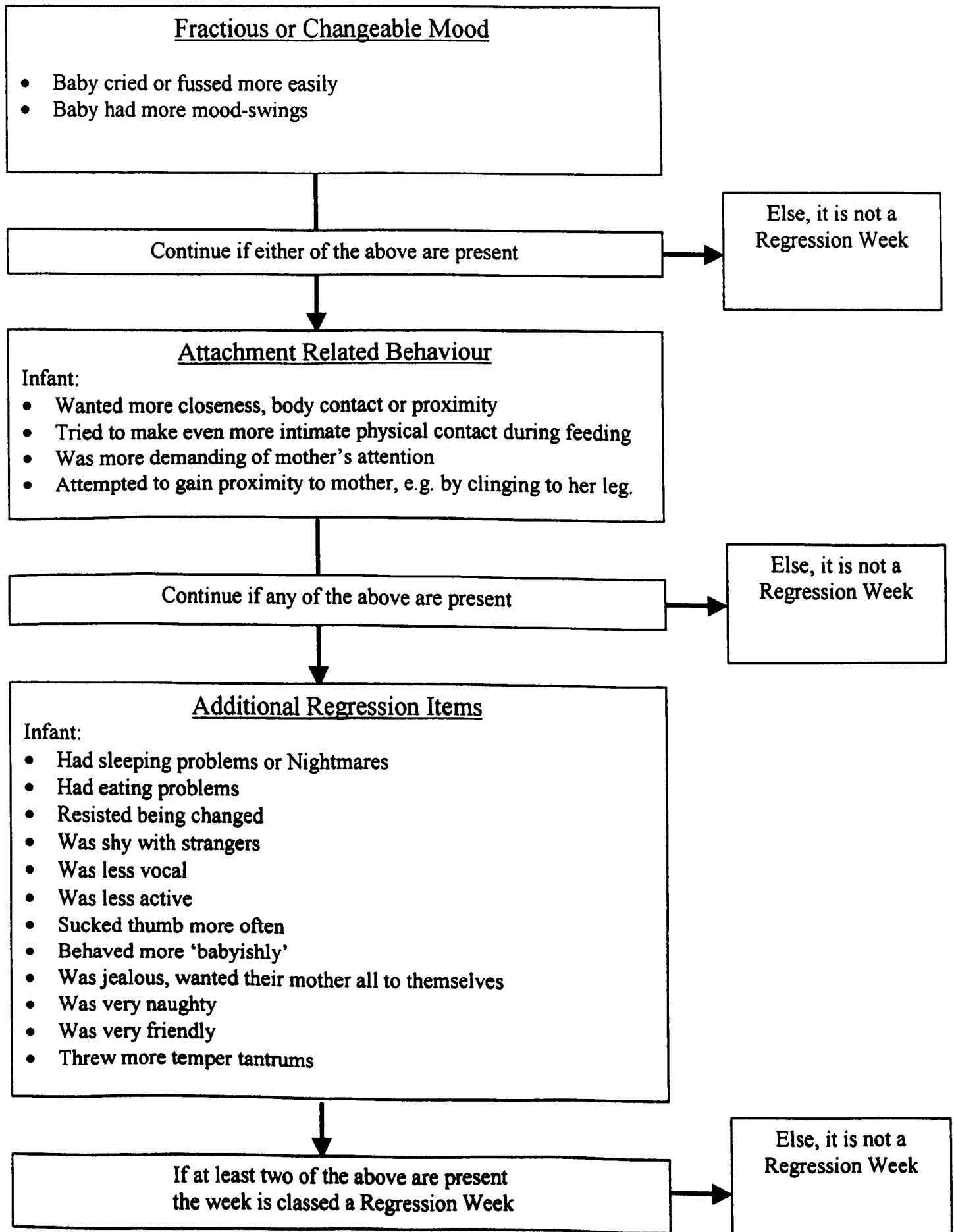
the weekly questionnaire was ambiguous, or if mother expressed concern about her feelings toward her infant, e.g. if she felt that she might harm her infant.

- **Structured observation** in the family home. Two mother-infant pairs were visited for a whole day, once a month, for the duration of the study. These observations focused on the proximity of the mother and her infant. The observations were designed to validate the information on infant behaviour from the questionnaire.

### 1.2.1. Findings of the 1992 study

The data were analysed in two ways. First, van de Rijt-Plooij & Plooij (1992) focused on a specific item from the weekly questionnaire: whether mother had felt that it had been a ‘difficult week’ looking after her infant. There is a Dutch word, which does not translate exactly into English, which means that baby was ‘more difficult’ or ‘more in need of mum’. If mothers reported that a week was more ‘difficult’, the week was labelled a Regression Week. For clarity this will be denoted Regression Week-M to indicate that it is based on mothers’ subjective rating of difficulty.

Second, the Weekly Questionnaire data of infant behaviour were analysed. van de Rijt-Plooij & Plooij (1992) determined which infant behaviours occurred most frequently during the Regression Weeks-M (as categorised above) that also occurred infrequently during non-Regression Weeks-M. From this analysis of specific infant behaviour they developed the algorithm presented in Figure 1.1. This three-step algorithm demands that for a week to be described as a Regression Week-IB (based on **I**nfant **B**ehaviour) the infant has to have more fractious mood or increased duration of crying, demonstrate attachment-related behaviour, and also display at least two additional ‘regression-specific’ behaviours (e.g. disrupted sleep pattern, increased fearfulness).





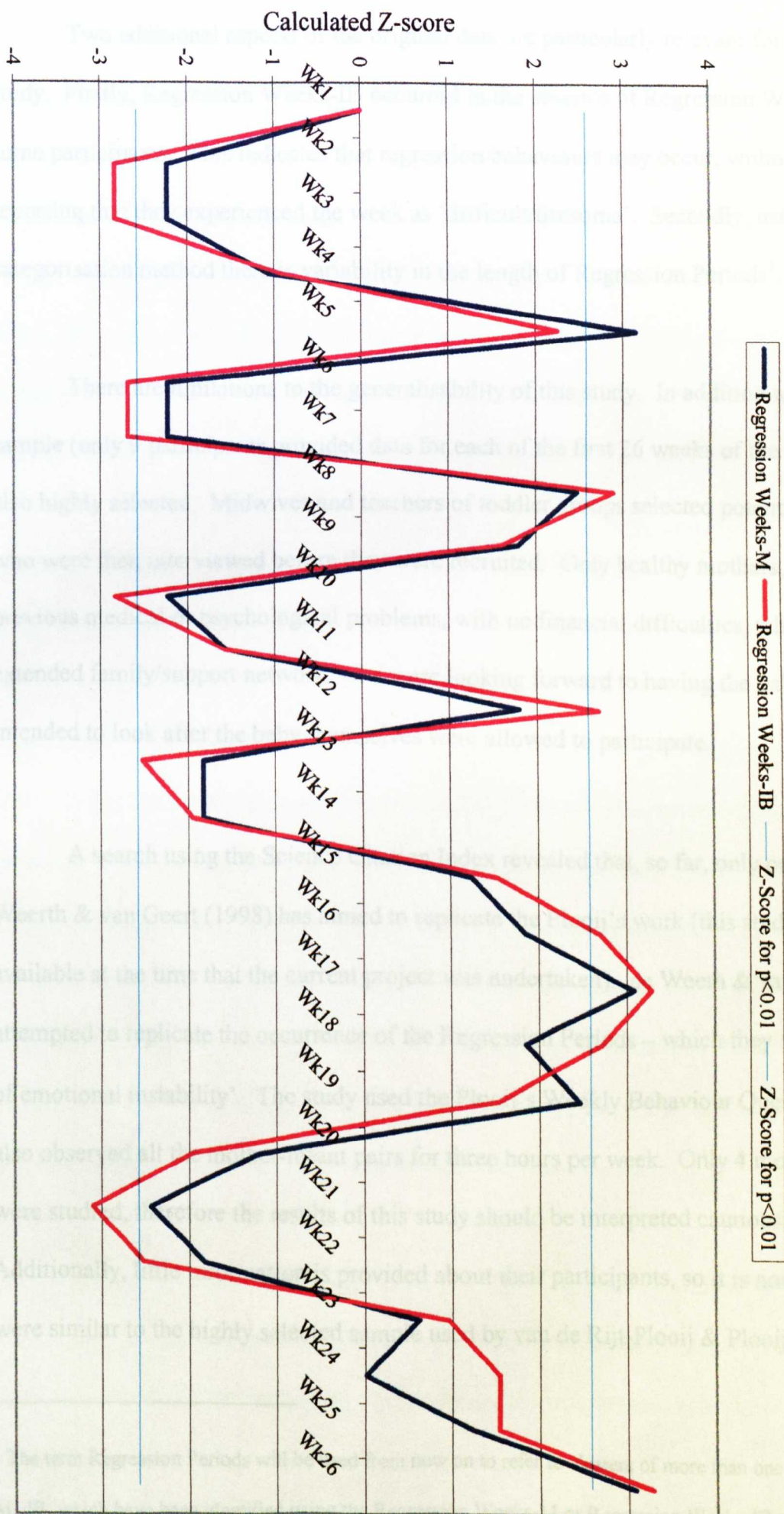
These analyses revealed that during the first 26 weeks of life, Regression Weeks-M occurred at weeks 5, 8, 12, 17 and 26. Regression Weeks-IB occurred at exactly the same time, indicating the categorisation system for Regression Weeks-IB was reliable. However, in the original article (van de Rijt-Plooij and Plooij, 1992), no statistical analyses were presented concerning the occurrence of the Regression Weeks-M/-IB.

### **1.2.2. Statistical Analysis of the Plooij's Data**

The original paper provides sufficient data for statistical analysis. Using the method chosen for this study (Z-test of proportions – see Section 3.5.1.), I analysed van de Rijt-Plooij & Plooij's (1992) data. This revealed that for the identified Regression Weeks-M at weeks 5, 12 and 26, a statistically significant proportion of mothers identified their infant as more tiresome/difficult ( $Z \geq 2.58$ ;  $p < 0.01$ , two-tailed).

The analysis of Regression Weeks-IB revealed eleven weeks, where the proportion of infants whose behaviour met the criteria for a Regression Period differed significantly from chance ( $p < 0.01$ ). For six of these eleven weeks a high percentage of participants reported Regression Weeks-IB (e.g. 92%), and for five weeks a low percentage of participants reported Regression Weeks-IB (e.g. 7%). This analysis suggests that there are four Regression Periods-IB in the first 26 weeks of life, at 8, 12, 16-18 and 26 weeks. There are also four 'Easy Periods', which occurred at weeks 2-3, 7, 10 and 21. Figure 1.2 presents these results, plotting calculated-Z over time, for both Regression Weeks-M and Regression Weeks-IB. This figure indicates that there is marked similarity between the weeks classed as Regression Weeks using the two methods.

Figure 1.2. Calculated Z-scores for Regression Weeks-M-IB, weeks 1 to 26 postpartum. Based on data from van de Rijt-Plooij & Plooij (1992)



Two additional aspects of the original data are particularly relevant for the current study. Firstly, Regression Weeks-IB occurred in the absence of Regression Weeks-M for some participants. This indicates that regression behaviours may occur, without mothers reporting that they experienced the week as 'difficult/tiresome'. Secondly, using either categorisation method there is variability in the length of Regression Periods<sup>1</sup>.

There are limitations to the generalisability of this study. In addition to having a small sample (only 9 participants provided data for each of the first 26 weeks of the study), it was also highly selected. Midwives and teachers of toddler groups selected potential participants, who were then interviewed before they were recruited. Only healthy mothers, with no previous medical or psychological problems, with no financial difficulties, who had an extended family/support network, who were looking forward to having the baby and who intended to look after the baby themselves were allowed to participate.

A search using the Science Citation Index revealed that, so far, only one study, de Weerth & van Geert (1998) has aimed to replicate the Plooij's work (this study was not available at the time that the current project was undertaken). de Weerth & van Geert (1998) attempted to replicate the occurrence of the Regression Periods – which they termed 'periods of emotional instability'. The study used the Plooij's Weekly Behaviour Questionnaire, and also observed all the mother-infant pairs for three hours per week. Only 4 mother-infant pairs were studied, therefore the results of this study should be interpreted cautiously. Additionally, little information is provided about their participants, so it is not known if they were similar to the highly selected sample used by van de Rijt-Plooij & Plooij (1992).

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<sup>1</sup> The term Regression Periods will be used from now on to refer to clusters of more than one Regression Week-M/IB, which have been identified using the Regression Weeks-M or Regression Weeks-IB methods.

de Weerth & van Geert (1998) did not find evidence to support the pattern of Regression Periods reported by van de Rijt-Plooij and Plooij (1992). Although they determined that there are episodes of regressive behaviour, there was no synchrony of timing of these periods across participants. However, a recent symposium, based on the work of the Plooij, Sadurni & Rostan (1997)<sup>2</sup> and Lindahl, Heimann & Ullstadius (in preparation)<sup>2</sup>, which taken as a whole includes 54 mother-infant pairs, concluded that there is considerable support for the existence and timing of Regression Periods (Cools, 1998). There continues to be a debate about the timing and the meaning of Regression Periods.

### **1.2.3. Additional Literature on Regression Periods**

There is agreement on the existence of certain developmental transitions in infancy. These occur at approximately 2, 7, 12 and 18-21 months (Konner, 1976; Lamborn & Fischer, 1988; Siegler, 1989; Trevarthen, 1988). Additionally, in a complicated theoretical analysis van Geert (1991) has modelled developmental skill acquisition. His mathematical model predicts periods of regression before a developmental transition; van Geert (1991) hypothesises that a transition occurs when two skills systems compete and one is superseded by the developmentally more advanced system. The notion that periods of regression precede new skills has been corroborated by researchers investigating skills development in infants. Fischer (1987) reviews evidence that suggests that before the transitions at approximately 2, 7 and 12 months there is observable regression behaviour.

van de Rijt-Plooij and Plooij (1992, 1993) have applied Perceptual Control Systems theory (see Powers, 1997) to explain the association between temporary regressions and the development of new understanding. Other compatible explanations for the occurrence and

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<sup>2</sup> As yet unpublished replications of van de Rijt-Plooij & Plooij (1992)

timing of transitions and their accompanying regression periods relate to neural re-organisation, and spurts in body length and head circumference. de Weerth and van Geert (1998) note that documented spurts in brain growth occur at roughly the same times as the identified regression periods, e.g. 3-4, 7-8, 10-11 and 15-18 weeks (Fischer & Rose, 1994).

It is not, however, the aim of this project to determine why regression periods occur. It is noted that attachment behaviour is triggered by stressors, e.g. fear, pain. The behaviour observed during the Regression Periods that are described in the literature (Fischer, 1987; de Weerth & van Geert, 1998; van de Rijt-Plooij & Plooij, 1992) appears indistinguishable from attachment behaviour. One of the assumptions for the current study is that during a developmental transition, the attachment behavioural system is triggered.

### 1.3. Attachment Theory

Bowlby proposed that Attachment is a stable 'Behavioural System' (see Archer, 1992) that operates to promote sufficient proximity to the principal care giver that parental protection is facilitated (Ainsworth, Blehar, Waters & Wall, 1978). The function of the attachment system is protection of the offspring.

#### **1.3.1. Attachment Behaviours**

The infant performs attachment behaviours, these behaviours function to increase proximity to the care-giver. These behaviours can be divided into **Signalling** (to attract the care-giver and maintain their proximity) and **Active** (moving to follow the care-giver or approaching the care giver). Once the goal of the behaviour has been achieved – ordinarily increased proximity – the behaviours cease, i.e. the infant stops crying when the parent returns to the infant and picks it up.

### 1.3.2. Attachment Relationship

There is a difference between attachment behaviours and the attachment relationship.

Attachment relationship refers to the bond or tie that the infant has to an attachment figure.

This bond develops over time, and its nature depends upon the past availability and sensitivity of the attachment figure to the infant.

Attachment is normally assessed when the infant is 12-18 months old (Ainsworth & Wittig, 1969). However, Mizukami, Kobayashi, Ishii & Iwata (1990) have shown that as early as 2 months old, infants behave differently with strangers, familiar figures and their mothers<sup>3</sup>. Mizukami *et al.* (1990) have also shown that characteristics of infant behaviour at 2 months are predictive of attachment measured at 12 months using the Strange Situation (Ainsworth & Wittig, 1969). This suggests that although attachment is typically measured when the infant is *at least* 9 months old, developing attachment relationships can be detected at a much earlier age.

### 1.3.3. Categories of infant-mother attachment

Infant distress on separation from, and reunion with their mothers is the primary way that attachment has been assessed in infants and young children. The classic research on the assessment and categorisation of attachment was performed by Ainsworth and colleagues (Ainsworth & Wittig, 1969; Ainsworth *et al.*, 1978) and led to the development of the Strange Situation.

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<sup>3</sup> In this section I have referred to mothers. In using this term I am referring to the infant's primary care-giver, and attachment figure. It is acknowledged that fathers can often take the role of primary care giver, but that it remains the norm in our society for mothers to take this role. This study also focuses on mothers and not fathers.

Research on attachment using the Strange Situation and other approaches has revealed that infant-mother attachment can be described using one of four categories.

A – these infants are minimally distressed by the disappearance of their mother and ignore or avoid her on her return. These infants are described as Insecurely Attached-Avoidant; typically 20% of a US sample of infants. Mothers of these children tend to ignore much of their child's distress, as if expecting the child to cope by themselves.

B – these infants may be distressed when their mother leaves, but she is greeted positively on her return; infants can be quickly calmed by their mother. These children are described as Securely Attached; typically 70% of a US sample. These mothers tend to be sensitive to their child's needs.

C – these infants are highly distressed when their mother leaves and are difficult to settle when she returns. These children are described as Insecurely Attached-Anxious; typically 10% of a US sample (all figures from Melhuish, 1993). The mothers of these children tend to be inconsistent in their care-giving, sometimes sensitive, sometimes effectively unavailable.

D – these infants appear to be distressed by their mother. They behave in a frightened way, lying prone on the floor, or they may 'freeze'. This category is not as well defined as the others, but contains behaviour described as 'disorganised' or 'disoriented' (Ainsworth & Eichberg, 1991). In a normal population, children do not frequently demonstrate this form of attachment. These children are described as Insecurely Attached-Disorganised. The mothers of these children may be suffering from unresolved trauma.

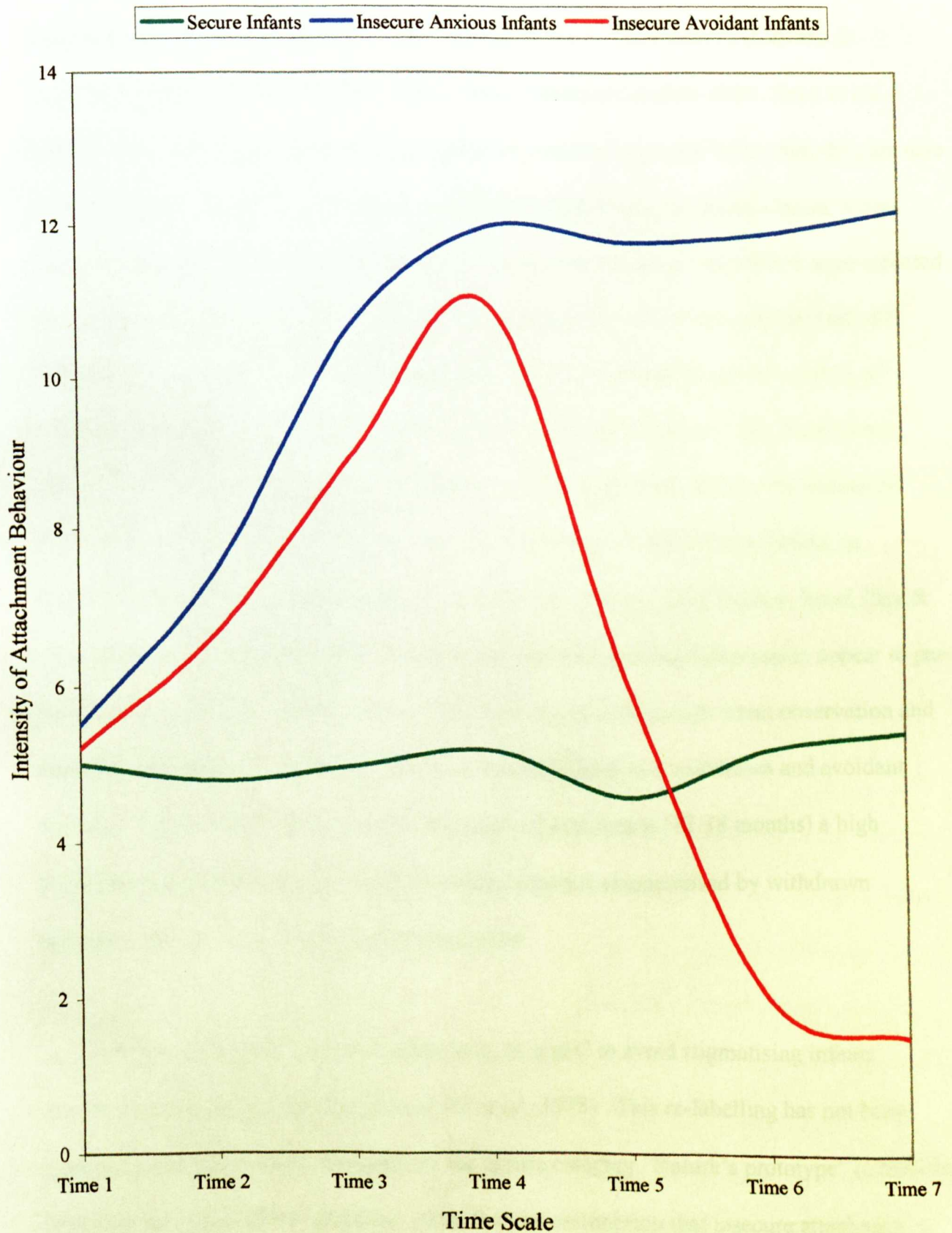
#### **1.3.4. A framework for conceptualising attachment relationship categories**

A framework for understanding attachment relationship categories A, B & C can be devised using a simple learning model. Neonates and infants have few abilities for performing attachment behaviours; crying is an exception. The infant's goal in crying, in attachment terms, is to bring the care giver to it. In general, attachment behaviour has the goal of proximity with the care giver, and the adaptive function of protection for the infant (e.g., from predators). Attachment behaviour is terminated by proximity. If the care-giver reliably approaches and provides the infant with security by holding or attending sensitively to the infant, a secure attachment tends to develop. The infant's attachment behaviour is positively reinforced. However, if the care giver is erratic in their response to the infant's crying this would equate to partial reinforcement and will result in intensified attachment behaviour. Finally, if the infant's crying is met with no response, the crying behaviour will extinguish and/or another attachment behaviour will replace it.

Using this framework the three categories of attachment can be ordered sequentially: Secure (B), Insecure-Anxious (C), Insecure Avoidant (A). Infants' attachment behaviour varies as they adapt to its contingency of reinforcement (presented graphically in Figure 1.3.) This framework receives some indirect support from research on the effect of maternal post-natal depression on infant behaviour.



Figure 1.3. A framework for Attachment Categories, showing how the three main categories can be ordered sequentially.



Studies have shown that infants of mothers with post-natal depression generally cry more and are more irritable. However, when attention is paid to the age of the infant a pattern emerges. Infants of mothers with post-natal depression cry more, exhibit more difficult behaviour and appear less content, around the age of two to three months (Cutrona & Troutman, 1986; Whiffen & Gotlib, 1989). When infants are slightly older, three to six months, they show fewer positive facial expressions and more protest behaviour, they are also reported to be more drowsy and less relaxed (Field, 1984; Field, Sandberg, Garcia, Vega-Lahr, Goldstein & Guy, 1985). Later again, at six to seven months, researchers have reported that infants fit one of two types; either the infants continue to show increased protest and difficult behaviour, or they are markedly more withdrawn and show a predominance of avoidance behaviour (Cohn, Matias, Tronick, Connell & Lyons-Ruth, 1986; Field, Healy, Goldstein & Guthertz, 1990). Finally, studies of infant attachment, again with infants of mothers with post-natal depression, find a high proportion of insecure attachment, in particular the insecure-avoidant category (Murray, 1992; Stein, Gath, Bucher, Bond, Day & Cooper, 1991). Seen sequentially, infants of women with post-natal depression appear to pass through a phase of increased crying at 2-6 months, measured through direct observation and maternal report, however, by 6 months some infants behave in a withdrawn and avoidant fashion. When infants are assessed on measures of attachment (12-18 months) a high proportion are categorised as insecure-avoidant, which is characterised by withdrawn behaviour and an absence of crying on separation.

Attachment categories were labelled A, B, and C to avoid stigmatising infants described as insecurely attached (Ainsworth *et al.*, 1978). This re-labelling has not been successful and most researchers consider the secure category “Nature’s prototype” (Chisholm, 1996, pp. 8). Hinde (1982) however, states that the assumption that insecure attachment is abnormal and maladaptive represents a misunderstanding of biology. Chisholm (1996)

suggests that differing forms of attachment are adaptive to the infant's environment. The specific function of each of the 'strategies' (e.g. insecure-avoidant, insecure-anxious) is to increase the infant's chance of survival and future reproduction (Chisholm, 1996). For example, the behaviour of the insecure-avoidant infant enables it to stay in the vicinity of a parent who ignores its distress. The behaviour of the insecure-ambivalent infant results in the infant remaining constantly close to the attachment figure, to minimise the risk that the attachment figure will not be available when needed.

#### **1.4. Post-natal Depression**

10-15% of women will suffer from an episode of clinical depression after the birth of their child (Thompson, 1997). The symptoms of post-natal depression are indistinguishable from depression occurring at other times (Murray, 1997a). The onset of depression in the year following childbirth most often occurs within the first two months after birth. Most episodes of post-natal depression remit within four months, though some studies have shown that a level of emotional disturbance can persist for at least a year (Thompson, 1997).

##### **1.4.1. Factors linked with the onset of post-natal depression**

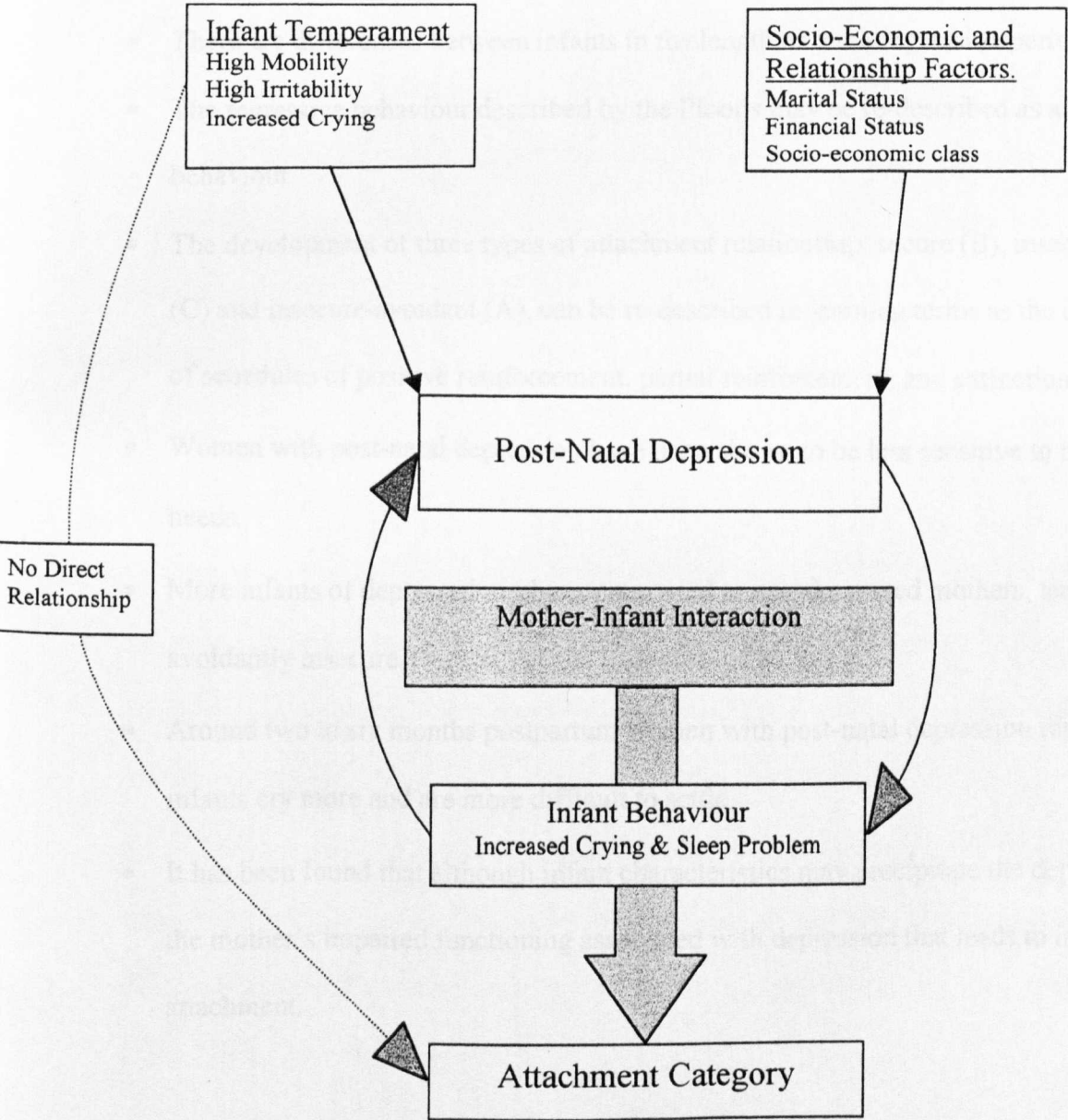
Research has shown that demographic and relationship variables correlate with the onset of post-natal depression. This has led to the development of a predictive index (Cooper, Murray, Hooper & West, 1996). Around 40% of Mothers-to-be with high scores on this index went on to develop post-natal depression. Most research in this area has focussed on the possible negative consequences of post-natal depression on infant development. However, Murray and colleagues (Murray, 1997b, Murray, Stanley, Hooper, King & Fiori-Cowley, 1996) present evidence which shows that early temperamental characteristics of the infant (measured in the first two weeks after birth) increase the risk of the mother developing post-natal depression.

### **1.4.2. Consequences of post-natal depression**

Women suffering from post-natal depression have been shown to interact differently with their infants (Papoušek & Papoušek, 1997). They are less sensitive to their infants' demands and cues, though this difference in sensitivity has been difficult to measure. Raphael-Leff (1983) has designed a simple semi-structured interview, which allows mothers of 6-month old infants to be categorised on a Facilitator-Regulator dimension.

Murray & Cooper (1997) have shown that approximately 50% of women with post-natal depression have infants with insecure categories of attachment (at 18 months), as compared to 30% in a normal population. Importantly, attachment is not simply the product of differences in temperament (Rutter, 1995). These findings lead to the model outlined in Figure 1.4. The model presents how the variables involved in mother-infant interactions relate. It suggests that although infant characteristics may precipitate the depression, it is the mother's impaired functioning associated with depression that leads to insecure attachment.

Figure 1.4. How variables involved in post-natal depression and the formation of an attachment may interact.



## 1.5. Summary of the relevant research findings

The current study is built on the following findings:

- van de Rijt-Plooij and Plooij (1992) have discovered 10 periods of ‘regressive’ behaviour in infants’ first 18 months of life.
- Regression periods were found to occur at almost exactly the same ages for full term normal infants.
- There are differences between infants in the length of these regression periods.
- The regressive behaviour described by the Plooij’s may be re-described as attachment behaviour.
- The development of three types of attachment relationship: secure (B), insecure-anxious (C) and insecure-avoidant (A), can be re-described in learning terms as the consequence of schedules of positive reinforcement, partial reinforcement, and extinction respectively.
- Women with post-natal depression have been shown to be less sensitive to their infants’ needs.
- More infants of depressed mothers, compared to non-depressed mothers, tend to be avoidantly insecure.
- Around two to six months postpartum women with post-natal depression report that their infants cry more and are more difficult to settle.
- It has been found that although infant characteristics may precipitate the depression, it is the mother’s impaired functioning associated with depression that leads to insecure attachment.

The hypotheses for the current study are based on these research findings and the following assumptions.

van de Rijt-Plooij & Plooij (1992) proposed that Regression Periods are linked with transitions in infant development. One of the assumptions for this study is that these transitions trigger the attachment behavioural system; so Regression Periods are a behavioural marker of developmental transitions.

A second assumption is that the length of Regression Periods are affected by the developing mother-infant attachment relationship. It has been reported that the infants of women with post-natal depression cry more and are more challenging to care for from 2-6 months. However, by 6-12 months the infants are increasingly withdrawn and their attachment categorised as insecure-avoidant. It is expected that the Regression Periods of infants whose mothers have post-natal depression will reflect this; through relative increases in length from 2-6 months post-partum, then relative decreases in length from 6-12 months.

### 1.6. Aims of the current study

The first aim of the current study is to test the existence of the Regression Periods reported by van de Rijt-Plooij & Plooij (1992). The second aim is to investigate the assumption that differences in the lengths of Regression Periods are associated with the developing infant-mother attachment. To do this, two groups will be studied: a group of well mothers and their infants and a group of mothers with post-natal depression and their infants. A group of mothers with post-natal depression was chosen because they represent a group at risk of developing insecure attachments. Specific hypotheses for the current study are presented after a discussion of methodological issues.

## 1.7. Methodological Issues

### **1.7.1. Time Scale**

van de Rijt-Plooij & Plooij (1992) used a prospective longitudinal multiple case-study design. They followed infants from their first week postpartum until the end of their 20<sup>th</sup> month. It would therefore be impossible to complete a full replication of this study, given the time available. A period of approximately four months was chosen as the time-frame for replication: from 12–26 weeks postpartum. van de Rijt-Plooij & Plooij (1992) report three Regression Periods during this time.

### **1.7.2. Method of Data Collection**

No home observations were planned. Home observations in the earlier studies (de Weeth & van Geert, 1998; van de Rijt-Plooij & Plooij, 1992) served to validate the information gained from the written questionnaire. The questionnaire's validity in written form has now been demonstrated (van de Rijt-Plooij & Plooij, 1992); and recently an orally administered version has also been thoroughly validated (de Weerth & van Geert, 1998). In order to maximise participation, weekly telephone calls, with the weekly questionnaire administered orally, in the form of a semi-structured interview were chosen.

### **1.7.3. Absence of important measures**

Infant temperament and Security of attachment would ideally have been included in this study. Both of these measures are very time-intensive and training in their administration is costly.

- **Infant temperament** would also have necessitated meeting participants in the first two weeks after birth and this was not possible given the design of the study.



- There are no measures for assessing **security of attachment** as early as 6-7 months.

However, a follow-up stage of the project is being developed, and security of attachment could be measured when the infants are around 18 months old.

## 1.8. Hypotheses

- Hypothesis 1.** Weeks 12, 17 and 26 will differ from other weeks, in that a higher percentage of mothers will report that their infants were more 'difficult/tiresome' (Regression Week-M).
- Hypothesis 2.** Weeks 12, 17, and 26 will differ from other weeks, in that a higher percentage of mothers will report infant behaviour that meets the criteria for Regression Week-IB.
- Hypothesis 3.** Regression Periods-M/IB will be longer for participants in the post-natal depression group as compared to participants in the control group.
- Hypothesis 4.** Participants in the post-natal depression group will score higher on the Facilitators & Regulators questionnaire, reflecting a more 'Regulatory' style of mothering.

## 2. Method

### 2.1. Design

This study used a prospective, longitudinal time series design. There were two independent groups: Group One – mothers of new-born infants who met the criteria for post-natal depression; Group Two – a control group of mothers of new-born infants who did not meet the criteria for post-natal depression.

### 2.2. Participation

#### **2.2.1. Participants**

All mothers registered with one of the participating Health Visitors (see below), who gave birth between July and December 1997, were invited to participate. Prospective participants were excluded if:

- They had a mental disorder other than post-natal depression
- They did not have fluent spoken English
- They did not have access to a telephone where they lived
- Their infant was born with less than 35 weeks gestation
- Their infant's Apgar<sup>4</sup> score at birth, one minute, or five minutes was less than five.

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<sup>4</sup> The Apgar scoring system is used to assess the condition of a new-born baby. It is based on five dimensions, each of which are scored from 0-2. The dimensions are: Colour – from blue to pink; Respiratory effort – from absent to good strong cry and regular breathing; Muscle Tone – from limp to well-flexed limbs; Reflex Irritability – from no response to crying; and Heart Rate – from absent to  $\geq 100$  beats per minute (BMA, 1995).

An additional criterion was set at the planning stage of the study: only primiparous mothers were to be invited to participate. This criterion was discarded early on because too few primiparous women were choosing to participate.

The criteria for inclusion in the post-natal depression (PND) group:

- ICD-10 (WHO, 1993) criteria met for Mild, Moderate or Severe Depressive Disorder, with post-natal onset.

The criteria for inclusion in the control group:

- Not meeting the ICD-10 (WHO, 1993) criteria for Mild, Moderate or Severe Depressive Disorder, with post-natal onset.

### **2.2.2. Classification of Diagnoses**

The Structured Clinical Interview for DSM IV (First, Spitzer, Gibbon & Williams, 1996) offers a stringent way of assessing Major Depressive Disorder. All participants' responses were inspected to see if they met the criteria for Major Depressive Disorder with postnatal onset. The DSM-IV (APA, 1994) criteria for Major Depressive Disorder are almost indistinguishable from the ICD-10 (WHO, 1993) criteria for Severe Depressive Episode. ICD-10 (WHO, 1993) also offers two additional classifications that relate to less severe episodes of depression: Mild Depressive Episode, and Moderate Depressive Episode. Nine participants met the criteria for Major Depressive Disorder/Severe Depressive Episode. A further six met the criteria for either Mild or Moderate Depressive Episode. Therefore, although it was initially intended to use the DSM-IV (APA, 1994) classification system, the

post-natal depression group is comprised of women meeting the ICD-10 (WHO, 1993) criteria for Depressive Episode with post-natal onset.

### **2.2.3. Method of Recruitment – Health Visitors**

A copy of the project proposal was sent to the Primary Care Development Officer for Oxfordshire. She invited my supervisor and myself to attend a Health Visitor Forum in June 1997. The Health Visitor Forum is a quarterly meeting for all Health Visitors working in Oxford City. We made a short presentation of the research and answered questions about the details of the study, the role for Health Visitors and ethical issues. My supervisor and I left the meeting to allow the Health Visitors to discuss the project as a group. At the end of their discussions, interested Health Visitors put their names onto a list, for me to contact with additional information.

All interested Health Visitors were sent an Information & Recruitment pack. This pack contained a letter to each Health Visitor (Appendix I); Information Sheets for Participants (Appendix II); and a log sheet to record details of interested prospective participants.

During the course of the study Health Visitors were contacted by telephone approximately fortnightly. This was to collect information on interested participants and to remind Health Visitors to introduce the project to new mothers. Individual meetings were also arranged with each of the Health Visitors in the study. This meeting served to outline their role in the project and clarify the method of recruitment. Often it was quite a long meeting with lots of questions about the theoretical basis of the project and the hypotheses being investigated. In addition to these meetings and the telephone calls, my supervisor and I attended two further Health Visitor Forums; firstly to remind people to continue with the

project and secondly to present some initial findings and ask for some information about the number of infants born (See Appendix VIII).

#### **2.2.4. Method of Recruitment – Mothers**

Health Visitors introduced the study to mothers. The earliest time to introduce the project was at the Primary Birth Visit (approximately two weeks after birth), or at any time until the infant's eighth week. Infants' eighth week is a formal contact point when Health Visitors meet with mothers. In Oxfordshire, all mothers complete the Edinburgh Post-natal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) during this meeting. At the eighth week meeting, Health Visitors reminded mothers about the project and asked them to decide if they would like to find out more about participating. All mothers interested in participating, or who wanted more information about the project, were given the Information Sheet for Participants (Appendix II).

Prospective participants gave their permission for their Health Visitor to pass their telephone number and EPDS score to me. Health Visitors recorded this information on their log sheet. This information was then passed on to me during my regular telephone contact with the Health Visitors. Alternatively, some Health Visitors contacted me directly with information about mothers wanting to participate.

### **2.3. Measures**

The measures used in this study, in order of administration, were:

- The Edinburgh Postnatal Depression Scale (EPDS; Cox *et al.*, 1987).
- Structured Clinical Interview for the Diagnostic and Statistical Manual IV – Research Criteria, Version 2.0 – Mood Episode Section (First *et al.*, 1996).
- Initial Interview for Regression Periods (van de Rijt-Plooij, von der Stelt & Plooij, 1996).

- Weekly Behaviour Diary (questionnaire) for Regression Periods (van de Rijt-Plooij & Plooij, 1993).
- Weekly Interview for Regression Periods (Plooij, 1997).
- The Facilitators and Regulators Questionnaire (Raphael-Leff, 1983; 1991).

All measures in this study were given orally, either face-to-face, or through telephone contact.

### **2.3.1. The Edinburgh Postnatal Depression Scale (Cox *et al.*, 1987).**

This is a ten-item self-report scale. It is designed to detect symptoms of depression in women who have recently given birth. This scale has been shown to have satisfactory sensitivity and specificity, and also has sensitivity to change over time. The reliability of the scale is reported as  $\alpha$ -coefficient 0.87. In the validation study (Cox *et al.*, 1987), a score greater than 12-13 (maximum score = 30) differentiated women meeting the Research Diagnostic Criteria for Depressive Illness from non-depressed women.

### **2.3.2. Structured Clinical Interview for DSM-IV (First *et al.*, 1996).**

This is a semi-structured interview designed to allow a diagnosis of mood episodes reaching the research criteria of DSM-IV (APA, 1994). It is completed by a clinician experienced in psychological assessment.

### **2.3.3. Initial Interview (van de Rijt-Plooij, von der Stelt and Plooij, 1996).**

This interview is designed to collect basic demographic and personal history information about the mother and infant (See Appendix III). In addition to factual information, there are questions that allow qualitative information to be recorded, e.g. how would you describe your baby? A native Dutch-speaker, who is also a clinical psychologist, translated this interview into English from Dutch for use in this study.

#### **2.3.4. Weekly Behaviour Diary (van de Rijt-Plooij & Plooij, 1993)**

This is a 40-item self-report questionnaire. Items in the questionnaire relate to specific, easily observable infant behaviours. Choosing such items for self-report has been shown to reduce inaccuracy in parental reports (Hubert, Wachs, Peter-Martin & Gandour, 1982; Thomas & Chess, 1982). There are also items that focus on mothers' reaction to their infant and to their infant's behaviour. The aim of the questionnaire is to collect information about 'regression behaviour' and additional information about the infant's behaviour and skills development. The questionnaire is completed weekly, and responses reflect the presence or absence of infant behaviour for the seven days that precede the completion of the questionnaire. It is always completed by the same person: the infant's mother.

The questionnaire has been shown to have good validity when completed by mothers (van de Rijt-Plooij & Plooij, 1993) and when used as a semi-structured interview, completed by the interviewer (de Weerth & van Geert, 1998). For this study an amended version of this questionnaire was used, combined with the Weekly Interview (Plooij, 1997).

#### **2.3.5. Weekly Interview for Regression Periods (Plooij, 1997).**

This 24-item semi-structured interview is designed to supplement the above questionnaire. This interview is completed by researchers. Its purpose is to collect additional information about infant behaviour and mothers' reactions to their infants. This additional information is sometimes required in order to classify weeks as Regression Weeks-IB.

For use in this study, five items from the interview, appropriate only for infants older than one-year of age were removed. As data were collected solely by interview this measure was combined with the Weekly Behaviour Diary. Through this combination three items were removed where there was considerable overlap between the two measures. One item was

added – item 48, which asks mothers to rate their mood on a ten-point scale from 0 (very low and depressed) to 10 (very bright and on top of things). These combined measures formed a 57-item semi-structured interview (this will now be referred to as the Regression Period Interview, RP Interview, Appendix IV).

The RP Interview comprised 37 questions about specific infant behaviours. The remaining 20 questions were about mothers' reactions to their infants and to their infants' behaviour, and mothers' mood and well-being.

### **2.3.6. Facilitators and Regulators Questionnaire (Raphael-Leff, 1983; 1991).**

This is a five-item semi-structured interview (See Appendix XVI). It was administered face-to-face during the final meeting with mothers (approximately week 28 postpartum).

Responses allow the classification of mothering style along a facilitator-regulator continuum. Scher & Blumberg (1992) investigated the psychometric properties of the original three-item questionnaire (Raphael-Leff, 1983). They found that despite excellent test-retest reliability, there was low internal reliability. This led to the development of the five-item questionnaire (Raphael-Leff, 1991) used in this study.

## **2.4. Procedure**

### **2.4.1. Step One**

After receiving details of women interested in participating in the study I contacted them by telephone to arrange a home visit. The home visits were typically made during baby's ninth week. During the home visit, the study was explained and any questions about participation were answered. If mothers were interested in continuing with the project, they were asked to sign a consent form (See Appendix V). Once consent had been given, I interviewed each participant using the Initial Interview (van de Rijt-Plooij *et al.*, 1996 – See Appendix III).



The SCID for DSM-IV (Mood Episodes Section; First *et al.*, 1996) was also completed during this visit.

After both interviews were completed, a convenient time was arranged for the weekly telephone calls (See 2.4.2.). Finally, participants were asked if they were happy for me to inform their GP of their participation (as advised by the Ethics Committee). This meeting typically lasted one hour.

Participants were allocated an alpha-numeric code, based on their initials and their place in the study, e.g. first person in the study was XXX01. Guidelines about confidentiality and data-protection were followed.

### *Informing GPs*

After participants had given their consent, their GPs were contacted using an individualised letter (See Appendix VI). The purpose of this letter was to inform GPs of the participation of their patients, and was not seeking permission from the GP. GPs were asked to state any reasons why their patients should not participate in the research project; the absence of a reply within a two-week period meant that GPs had no objection to their patients taking part in the project. This two-week period coincided with the time between the initial interview and the start of the telephone calls.

### **2.4.2. Step Two**

The main part of the study was the collection of weekly data about the infant's behaviour and mother's reaction to her infant's behaviour. These data were collected using the RP Interview; comprising questions from the Weekly Behaviour Diary (van de Rijt-Plooij & Plooij, 1993) and the Weekly Interview (Plooij, 1997). The first telephone call was planned to occur during

baby's eleventh week. All 57 questions were answered during each call. However, a conversational style was adopted, as opposed to each question being asked in a closed fashion. This facilitated rapport and the building of a relationship with each participant. All RP Interviews were conducted whilst inputting information into a computer program (see below – Automated coding of interview data). Calls typically lasted 10 minutes and continued, weekly until the infant's 26<sup>th</sup> week. All calls were scheduled for the same time, on the same day each week. If participants could not be contacted within three days of the agreed call-time, data for that week were deemed missed.

During each call, in addition to coding responses to specific questions, general notes were also made. These notes concerned events in the family and behaviours or events that could not simply be numerically coded, e.g. what foods baby preferred in a certain week. These notes were formalised by typing them up and recording them along with the answers to the questions. These notes also formed the basis of a Presentation Booklet given to mothers at the end of the study.

#### *Data Collection During Holiday Periods*

At the holiday periods at Christmas and Easter, individual arrangements were made with each participant concerning the collection of data. For one week during the holiday period at Christmas and again for one week at Easter, no telephone calls were made. For these weeks participants were sent a written version of the interview (See Appendix IV) and were provided with a stamped-addressed envelope. Participants were also given written versions of the interview when they took holidays at other times during the study.

### *Automated coding of interview data*

A computer program (Program Name: Interview) was written to automate coding of the interview data (See Appendix VII). The program prompted the interviewer by displaying questions on the computer screen, the response could then be inputted and was displayed on a summary page. The summary page also prompted the interviewer about questions remaining. This program allowed questions from the RP Interview to be asked in any sequence, whilst keeping track of which questions had been asked. Additionally, questions were grouped into meaningful units. At the end of the interview when all questions had been responded to, the data from the interview were written to a floppy disk in a format compatible with data analysis software. This minimised two potential sources of error: missing questions from the interview and errors in inputting data into data analysis software. The flexibility of this program allowed the interview to follow mothers' conversation and code questions in any order.

### *Missed Calls*

If participants were not able to answer the call at the arranged time, I called regularly until I had contacted the participant – this may have been an hour later, or as long as three days later. If the call was not made at the arranged time, precautions were made when interviewing. The participant was encouraged to only include information which would have been available at the time the call should have been made, e.g. if the call was made on Thursday instead of Tuesday, only behaviour noticed until Tuesday was asked about during the call. If the call could not be repeated within three days, data from that week were deemed missing.

### **2.4.3. Step Three**

The weekly telephone calls continued until infants' 26<sup>th</sup> week (See section 2.6. Gestational Age Corrections). During the final telephone call an appointment was made to visit the

participant at home. This home visit was planned for within four weeks of the final telephone call. At this home visit, participants were given a presentation booklet. This booklet contained written summaries of notes made during the weekly interviews and served as a souvenir of the infant's development over the months of the study. Also included in the booklet were two charts. Chart 1 was a graphical presentation of data collected from the participant's infant – a chart of individual regression periods. Chart 2 was a summary of the group results. Chart 2 was updated as each participant completed the study. During the visit, early results were explained to participants. Participants also had the opportunity to ask questions about their infant's progress and the group results.

During the home visit the Facilitators & Regulators questionnaire (Raphael-Leff, 1991) was completed. At the end of the meeting mothers were thanked for their participation in the project. They were also asked informally about how they had found participating in the project. Mothers were asked if they would be prepared for me to contact them again if a further stage to the project could be agreed and financed. Additionally, they were informed that as not all the results were known at the time of the visit, that they would receive a summary of the results of the project, by post in about August 1998.

#### *Letter to Health Visitors*

Health Visitors were sent an individualised letter in March 1998 (See Appendix VIII). This letter served three purposes:

- It offered thanks for the Health Visitors commitment to the project;
- It requested information about the number of births referred to Health Visitors over the duration of the project;
- It requested information about EPDS scores that had not been forwarded when mothers were referred to the study.

At the end of the study Health Visitors were invited to a 'thank you' lunch. Summarised results of the study will also be sent to Health Visitors in August 1998.

## 2.5. Ethical Approval

Ethical Approval was sought from the Oxford Psychiatric Research and Ethics Committee in July 1997. Ethical Approval was conditionally granted in July 1997 (See Appendix X).

Advice from the Ethics Committee was incorporated into the information for participants and conditions for full approval, including indemnity, were met in August 1997 (See Appendix XI).

The final sections of the Method outline the procedures for data analysis.

## 2.6. 'Gestational Age' and 'Age from date of birth'

There are at least two ways of measuring the age at which Regression Periods occur: using age from date of birth, and using gestational age. When Regression Periods are calculated from 'Age at Date of Birth', Week 1 is the first seven days of life, starting from the infant's birth date. When Regression Periods are calculated from 'Gestational Age', Week 1 is the first seven days starting from the date at which delivery was due. This due date is typically calculated using Naegle's rule; based on the assumption that human gestation is ten menstrual cycles (McGinnis, 1996). An alternative method for calculating due-dates is based on the Mittendorf-Williams Rule, which uses a computer model to predict due dates (Mittendorf, Williams, Berkey, Lieberman & Monson, 1993). Medical practice in this country means that delivery is induced if the pregnancy extends to more than two weeks past the due-date.

In this study dates were anchored to the infant's date of birth, e.g. 8-week EPDS.

Weekly RP Interview data were collected until at least Week 26 postpartum for all infants.

However, for infants born prematurely, data were collected until their 26<sup>th</sup> Week based on gestational age (See Figure 2.1 for an illustration).

## 2.7. Transformation of Interview Data

The RP Interview consists of 57 questions, each participant is interviewed weekly, and answers to the interview refer to the previous seven days. Of the 57 questions, 20 relate to mothers' general well-being, and how they experienced their infant. 37 questions relate to specific infant behaviours. Two methods were used to analyse these data.

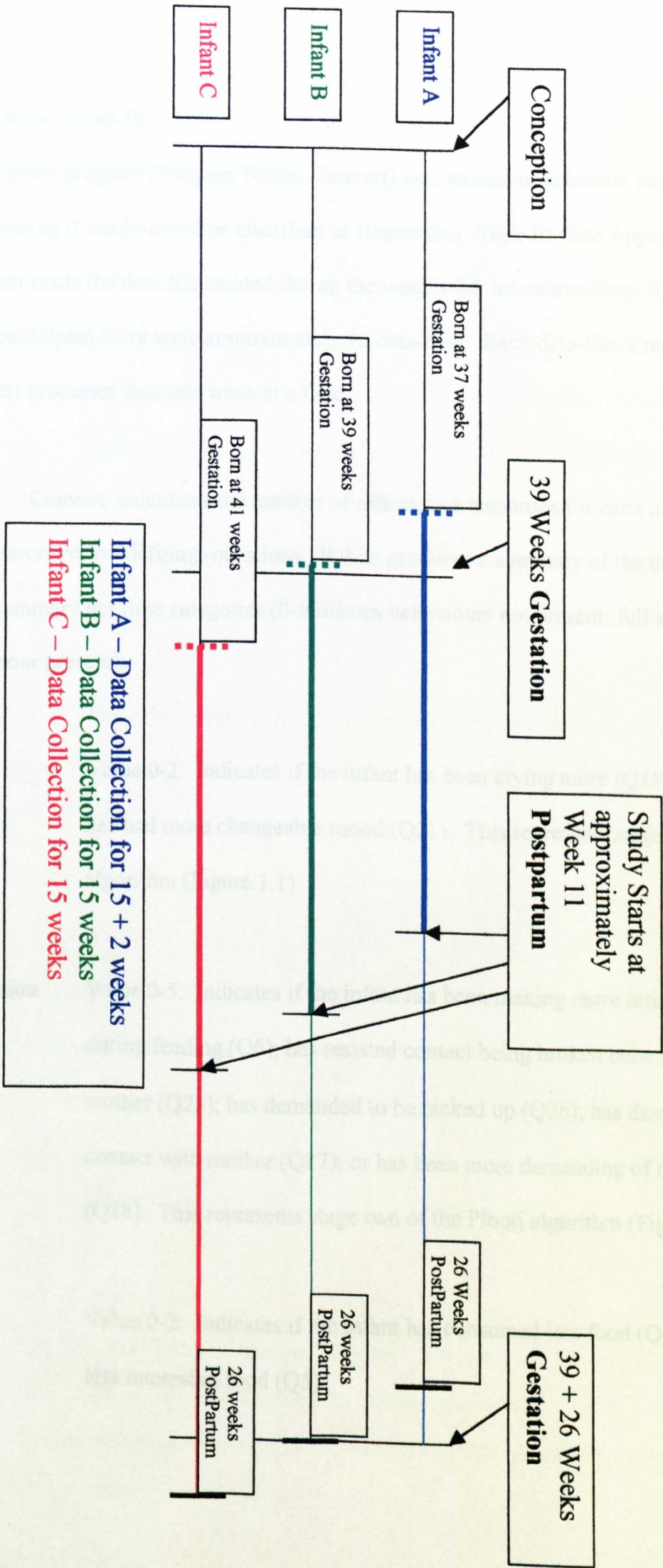
### **2.7.1. Method 1 - Plooij Method.**

One of the mothers' questions is used to determine if a week is a Regression Week, based on mother's experience (Regression Week-M). 19 of the 37 infant behaviour questions are used to determine if a week can be classified as a Regression Week, based on Infant Behaviour (Regression Week-IB).

#### *Regression Weeks-M.*

As in the van de Rijt-Plooij and Plooij study (1992), weeks were classified as Regression Weeks-M if mothers reported their infants to be more tiresome (Q49 from RP Interview).

Figure 2.1. Data collection intervals for infants born premature, full term and over-due.



### *Regression Weeks-IB.*

A computer program (Program Name: Convert) was written to automate the process of determining if weeks could be classified as Regression Week-IB (See Appendix IX). This program reads the data-file created during the weekly RP interview (from 'Interview'). For each participant there were approximately 15 data-files. Each data-file is read separately as Convert processes data one week at a time.

'Convert' calculates the number of affirmative responses for each of the 19 Regression-Period-defining-questions. It then produces a summary of the data for each week. This summary has nine categories (0-indicates behaviours not present; full score indicates all behaviour present):

- |                  |  |
|------------------|--|
| <b>Cry</b>       | Value 0-2. Indicates if the infant has been crying more (Q18) or if the infant has had more changeable mood (Q21). This represents stage one of the Plooij algorithm (Figure 1.1).   |
| <b>Attention</b> | Value 0-5. Indicates if the infant has been making more intimate contact during feeding (Q6); has resisted contact being broken between itself and mother (Q23); has demanded to be picked up (Q26); has demanded increased contact with mother (Q27); or has been more demanding of mother's attention (Q28). This represents stage two of the Plooij algorithm (Figure 1.1). |
| <b>Food</b>      | Value 0-2. Indicates if the infant has consumed less food (Q4) or has shown less interest in food (Q5).  |



<b>Sleep</b>	Value 0-2. Indicates if the infant has slept less (Q7) or has had disturbed sleep/bad dreams (Q8).
<b>Change</b>	Value 0-1. Indicates if the infant has resisted being changed (Q24).
<b>Baby</b>	Value 0-2. Indicates if the infant has shown more 'babyish' or 'regressive' behaviours <sup>5</sup> (Q22) or has sucked their thumb, fingers or hand for longer (Q34).
<b>Fear</b>	Value 0-2. Indicates if the infant has been more shy around strangers or unfamiliar people (Q25) or has developed new fears (Q37).
<b>Vocal</b>	Value 0-1. Indicates if the infant has been less vocal (Q30 – reverse scored).
<b>Active</b>	Value 0-2. Indicates if the infant has moved less (Q31), or has had a decreased level of activity (Q32).

Food, Sleep, Change, Baby, Fear, Vocal and Active all relate to stage three of the Plooij Algorithm (Figure 1.1).

'Convert' produces three additional values:

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<sup>5</sup> This question was often met with puzzlement by mothers. The meaning given to the question was – has your baby started to do things again, that s/he used to do, but has stopped doing for a while. An example of this would be blowing raspberries – a babbling infant may regress to blowing raspberries for a while, before returning to babbling again.

<b>Overall</b>	Value 0-19. This is the sum of all the above categories – and can be seen as an index of the likelihood that a week is a Regression Week-IB.
<b>Tiresome</b>	Value 0-1. This refers to mothers' question (Q49) and is used to determine Regression Weeks-M.
<b>Difficult</b>	Value 0-3. This refers to mothers' questions (Q53, 54, 55): did mother wish that baby was 'out of the way' at any time; did mother get annoyed by the infant at any time; did mother find the week particularly difficult.

This summary facilitates the process of determining if a week can be categorised as Regression Week IB. Exactly the same algorithm (Figure 1.1.) is used, as in the van de Rijt-Plooij & Plooij study (1992).

### **2.7.2. Method 2 – Correcting for Infant Illness.**

Two factors were seen as possibly influencing data transformed using Method 1: firstly, infant illness may lead to weeks falsely being categorised as Regression Weeks-IB; secondly, immunisations may affect infant behaviour, again leading to weeks falsely being categorised as Regression Weeks-IB. In an attempt to minimise these sources of error, the weekly notes made during each interview and summary from 'Convert' were reviewed and four categorisations made:

- Normal week
- Regression Week
- Infant Illness<sup>6</sup>
- Immunisation

To ensure this categorisation was made reliably, all weekly data from 20 randomly selected participants were categorised by an independent rater.

As an additional way of investigating the raters' categorisation of weeks as 'regression' weeks, a Hierarchical Cluster Analysis was undertaken. Cluster analysis is an exploratory method, which identifies relatively homogenous groups based on selected characteristics. A hierarchical cluster analysis was used to group the data into clusters, which were then interpreted as either 'normal', or 'regression' weeks.

Each participant's data were analysed individually. The whole data sheet, with responses to each of the 57 questions from the RP Interview, for each of the weeks of the study was divided into two sections: the 37 infant behaviour questions and the 20 mothers' questions. Before the 37 infant behaviour questions were analysed, data from six questions were removed (Q1, Q2, Q3, Q17, Q19 & Q20) because the data could not be coded numerically, or because they may affect the analysis. Thus, variables that related to infant illness or immunisations had been removed. In addition, weeks that had been categorised as 'illness' by the raters were also removed. The output of the cluster analysis, with weeks interpreted as 'normal' or 'regression' were compared against raters' categorisations.

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<sup>6</sup> In addition to illnesses, clear disruptions to the household were included, e.g. flying to New Zealand.

## 3. Results

This section starts with the presentation of descriptive data about the sample. Next, the similarities and differences between the two groups are determined on measures of depression and demographic variables. This is followed by a section describing the data set, the tests that were undertaken to ensure its reliability and the variables calculated from it. Summary data that are directly relevant to the hypotheses precede the investigation and statistical tests of the four hypotheses. The section concludes with two additional analyses.

### 3.1. Descriptive Data

#### **3.1.1 Health Visitors**

Twenty Health Visitors from 12 practices/health centres were involved in this research. The practices covered: North Oxford, Summertown, Jericho & Central Oxford, Headington, East Oxford, Horspath, Blackbird Leys and Greater Leys, Rosehill, Cowley and Temple Cowley. Health visitors referred mother-infant dyads to the study for six months; this was the recruitment phase (September 1997 - March 1998).

#### **3.1.2. The sample as a proportion of all births**

Infant birth dates ranged from July-December 1997. Health Visitors provided data on the number of new births referred to them over this time. These data are summarised in Table 3.1. The table shows the number of new referrals to Health Visitors each month from July-December 1997. The July figure for referrals to the study is particularly low, as only infants born at the end of the month were the right age for this study. The highest proportion of infants referred to the study, out of all new-born infants referred to Health Visitors, were born in August, September and October.

Table 3.1. The numbers of new-born infants referred to Health Visitors and those who took part in the study, for infants born between July and December 1997.

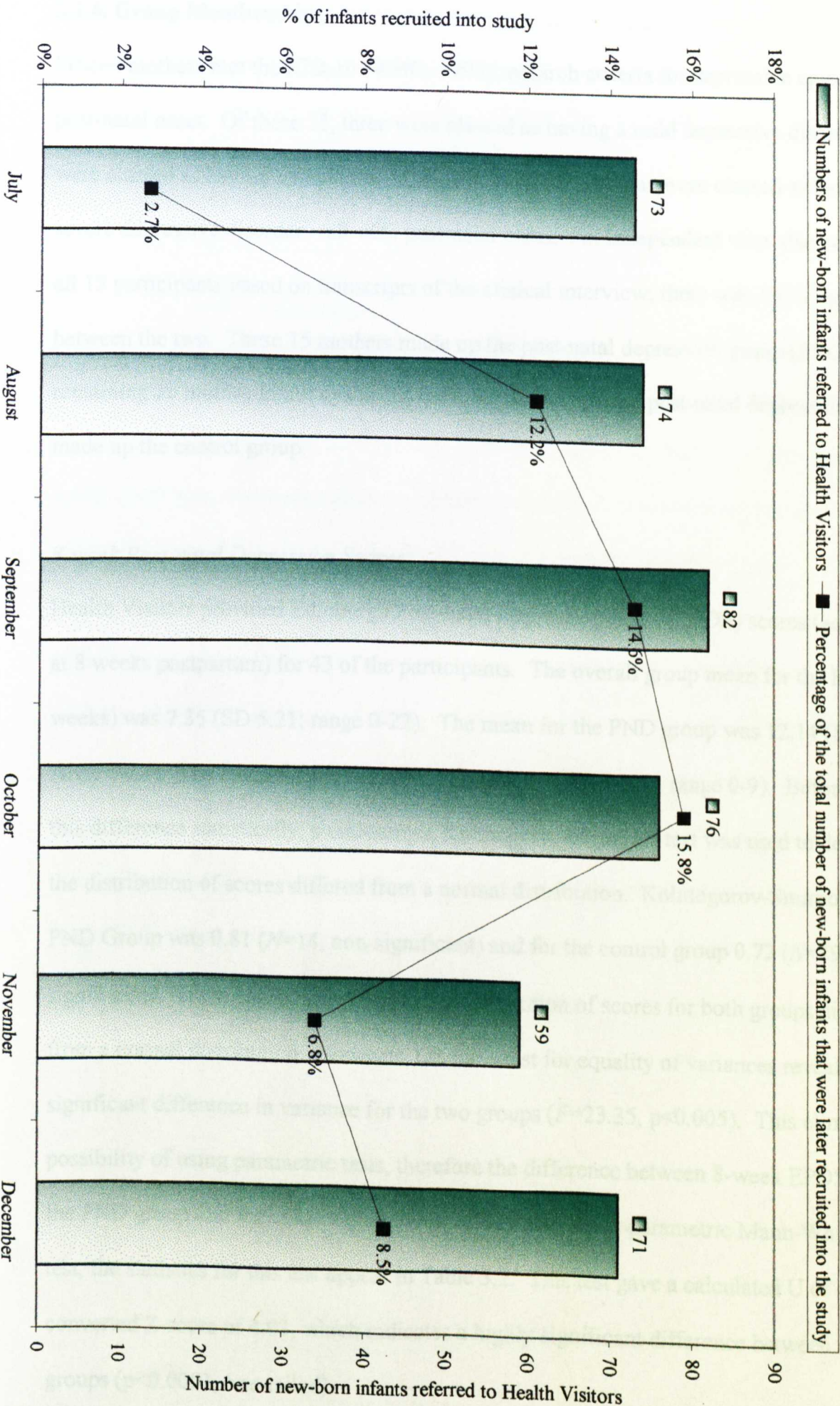
	July	Aug	Sept	Oct	Nov	Dec
Total number of infants referred to Health Visitors	73	74	82	76	59	71
Total number of these infants who took part in the study	2	9	12	12	4	6

To calculate the sample as a proportion of all births, the number of infants who were later referred into the study, was divided by the total number of infants (referred to Health Visitors) who were born in the same month. These data are plotted in Figure 3.1. The figure shows that during August, September and October, between 12 and 16 per cent of all new-born infants referred to the participating Health Visitors went on to join the study. In July, and again in November and December, this fell to between 5 and 10 per cent. These percentages are an over-estimate because data about new-births was not returned by one Health Visitor.

**3.1.3. Number of Participants**

The Health Visitors referred 48 mother-infant dyads into the study. Two participants did not meet the inclusion criteria: one infant was too old, and one participant did not have convenient access to a telephone, the other prospective participant was shortly to move out of the area. All the remaining 45 chose to participate and none dropped out.

Figure 3.1. The number of new-born babies referred to Health Visitors, and the percentage of those infants who were later recruited into the study.



### 3.1.4. Group Membership

Fifteen mothers met the ICD-10 (WHO, 1993) research criteria for depressive episode with post-natal onset. Of these 15, three were classed as having a mild depressive disorder, three were classed as having a moderate depressive disorder and nine were classed as having a severe depressive disorder – all with post-natal onset. An independent rater also categorised all 15 participants based on transcripts of the clinical interview; there was 100% agreement between the two. These 15 mothers made up the post-natal depression group (PDG). The remaining 30 mother-infant dyads did not meet the criteria for post-natal depression, and made up the control group.

#### *8-week Post-natal Depression Scores*

Health Visitors provided Edinburgh Post-natal Depression Scale (EPDS) scores (administered at 8 weeks postpartum) for 43 of the participants. The overall group mean for the EPDS (8-weeks) was 7.35 (SD 5.21; range 0-22). The mean for the PND group was 12.14 (SD 6.11; range 5-22). The mean for the control group was 5.04 (SD 2.50; range 0-9). Before testing this difference statistically, a one-sample Kolmogorov-Smirnoff test was used to determine if the distribution of scores differed from a normal distribution. Kolmogorov-Smirnoff Z for the PND Group was 0.81 ( $N=14$ ; non-significant) and for the control group 0.72 ( $N=29$ ; non-significant). These scores indicate that the distribution of scores for both groups did not differ from a normal distribution. However, Levine's test for equality of variances revealed a significant difference in variance for the two groups ( $F=23.35$ ,  $p<0.005$ ). This eliminated the possibility of using parametric tests, therefore the difference between 8-week EPDS scores for the PND group and the control group was tested using a non-parametric Mann-Whitney U test, the statistics for this test appear in Table 3.2. This test gave a calculated U of 48.50 and a converted Z-score of 4.03, which indicates a highly significant difference between the two groups ( $p<0.0001$ , one-tailed).

Table 3.2. The difference in Edinburgh Post-natal Depression Scale (8 week) scores for the two groups, tested using Mann-Whitney U.

	N	Mean Rank	Σ Ranks	M-W <sup>a</sup> U	Z
PND group	14	33.04	462.50	48.50	-4.03 <sup>*</sup>
Control group	29	16.67	483.50		

<sup>\*</sup>p<0.0001  
M-W<sup>a</sup> – Mann-Whitney U

The EPDS was administered again at week 16 and week 25 postpartum. The mean scores for the two groups for all three administrations appear in Table 3.3. The mean scores for the PND group decreased slightly over time, whereas for the control group they remained relatively constant. To test the difference in scores over time for the PND group, the distribution of scores for the three measures was first checked to ensure that they did not differ from a normal distribution using one-sample Kolmogorov Smirnov tests. These tests were non-significant, indicating that the distributions of scores for each of the three administrations did not differ from a normal distribution. A one-way ANOVA was then selected to test the difference between administrations. The ANOVA was non-significant (See Table 3.4), indicating no statistically significant difference in mean scores on the EPDS for the PND group over time.



Table 3.3. Summary statistics for the three administrations of the Edinburgh

Post-natal Depression Scale (EPDS), for the PND and control groups.

	EPDS Week8	EPDS Week16	EPDS Week25
PND group	12.14 <sup>a</sup>	9.64	9.31
	6.11 <sup>b</sup>	5.22	5.77
	(5-22) <sup>c</sup>	(0-17)	(3-20)
	14 <sup>d</sup>	11	13
Control group	5.04	5.29	4.81
	2.50	2.54	2.79
	(0-9)	(1-11)	(0-12)
	29	28	26

Format for table   <sup>a</sup>Mean  
                             <sup>b</sup>Standard Deviation  
                             <sup>c</sup>Range  
                             <sup>d</sup>N

Table 3.4. ANOVA statistics for the three administrations of the Edinburgh

Post-natal Depression Scale for the PND group.

	Sum of Squares	df	Mean Square	F
Between Groups	64.37	2	32.18	0.97 <sup>ns</sup>
Within Groups	1157.03	35	33.06	
TOTAL	1221.40	37		

<sup>ns</sup>Non-significant

3.1.5. Infant Characteristics

There were 46 infants in the study; 44 singletons and 2 non-identical twins. Twenty-six infants were male (56.5%), 20 were female (43.5%). The mean birth-weight of the 46 infants was 3.49 kilograms (SD 0.52; range 1.96-4.59). Their median APGAR score at one-minute was 9 (range 5-10).

3.1.6. Pregnancy & Delivery Characteristics

For the 46 infants, 40 were born through normal vaginal deliveries. Three mothers underwent elective caesarean sections and three underwent emergency caesarean sections. The mean duration of the first stage of labour was 428.74 minutes (SD 300.46; range 50-1440). The

mean duration of the second stage of labour was 59.88 minutes (SD 63.45; range 6-300).

Twenty-nine of the 45 women (64%) had no anaesthesia, 16 (36%) women had anaesthesia.

### **3.1.7. Characteristics of the Mothers**

Mean maternal age (calculated at infant's date of birth) was 31.60 years (SD 5.38; range 21.17-41.58). Forty-two of the mothers lived with a partner (93%); 33 of these 42 were married (79%), 9 were un-married (21%). Two mothers lived with their parents and were still in contact with their infant's father (4%). One mother lived on her own and still had contact with her infant's father (2%).

#### *Race and Nationality*

Of the 45 women: 39 described themselves as White-European (87%), 2 as Black (4%), 2 as Indian (4%), 1 as South American (2%) and 1 as Turkish (2%). Of the 45 women: 35 were of British Nationality (78%); 2 were German (4%), 2 were Irish (4%), 2 were American (4%), 1 was Swiss (1%), 1 was Nigerian (2%), 1 was Colombian (2%), and 1 was Indian (2%).

#### *Previous Live Births*

Twenty-eight of the mothers were primiparous (62%). 11 had one elder child (24%), 5 had two elder children (11%), and 1 had five elder children (2%).

#### *Education and Socio-economic Class*

Mean length of education for the mothers (See Appendix XII for method) was 14.73 years (SD 2.51; range 11-19). Socio-economic class categorisations were made on the basis of husbands'/partners' occupation. In the one case where this was not applicable the mother's occupation was used. Categorisations were made using the Standard Occupational Classification System (Office of Population Censuses & Surveys, 1991):

- Social Class I      23 participants (51%)
- Social Class II      5 participants (11%)
- Social Class III      13 participants(29%)
- Social Class IV      3 participants (7%)
- Social Class V      1 participant (2%).

### 3.2. Group comparisons for Demographic Data

The PND and control groups differed in their mean scores on the EPDS (administered at 8 weeks). Further comparisons were made to determine if any of the following variables differentiated the two groups:

- Sex of Infant
- Infant birth weight
- Infant APGAR score at 1-minute postpartum
- Length of Labour (Stage 1)
- Length of Labour (Stage 2)
- Use of anaesthesia
- Maternal Age
- Relationship Status
- Presence of elder children
- Maternal Education
- Socio-economic class

Three sections are presented depending on the statistics used. Firstly, frequency data are tested using chi-squared, secondly categorical data and non-normally distributed data are tested using non-parametric tests, normally distributed data are tested using parametric tests.

There were no suitable statistical tests to determine the difference between the two groups on Relationship Status, so these data are presented graphically in Figure 3.2. This figure shows that a higher percentage of control group participants are married, and that no control group participants live without a partner.

3.2.1. Frequency Data

*Sex of Infant and Use of Anaesthesia.*

Table 3.5 shows the number of male and female infants in each of the two groups. Although there appeared to be more male infants in the PND group, when the difference in distribution across the two groups was tested using a chi-squared test ( $\chi^2 (1) = 0.92$ , non significant) there were no significant differences. Table 3.5 also shows the number of mothers who had anaesthesia during delivery. The difference in distribution across the two groups was tested using chi-squared ( $\chi^2 (1) = 0.77$ , non significant). This test indicates that there is no significant difference between the two groups.

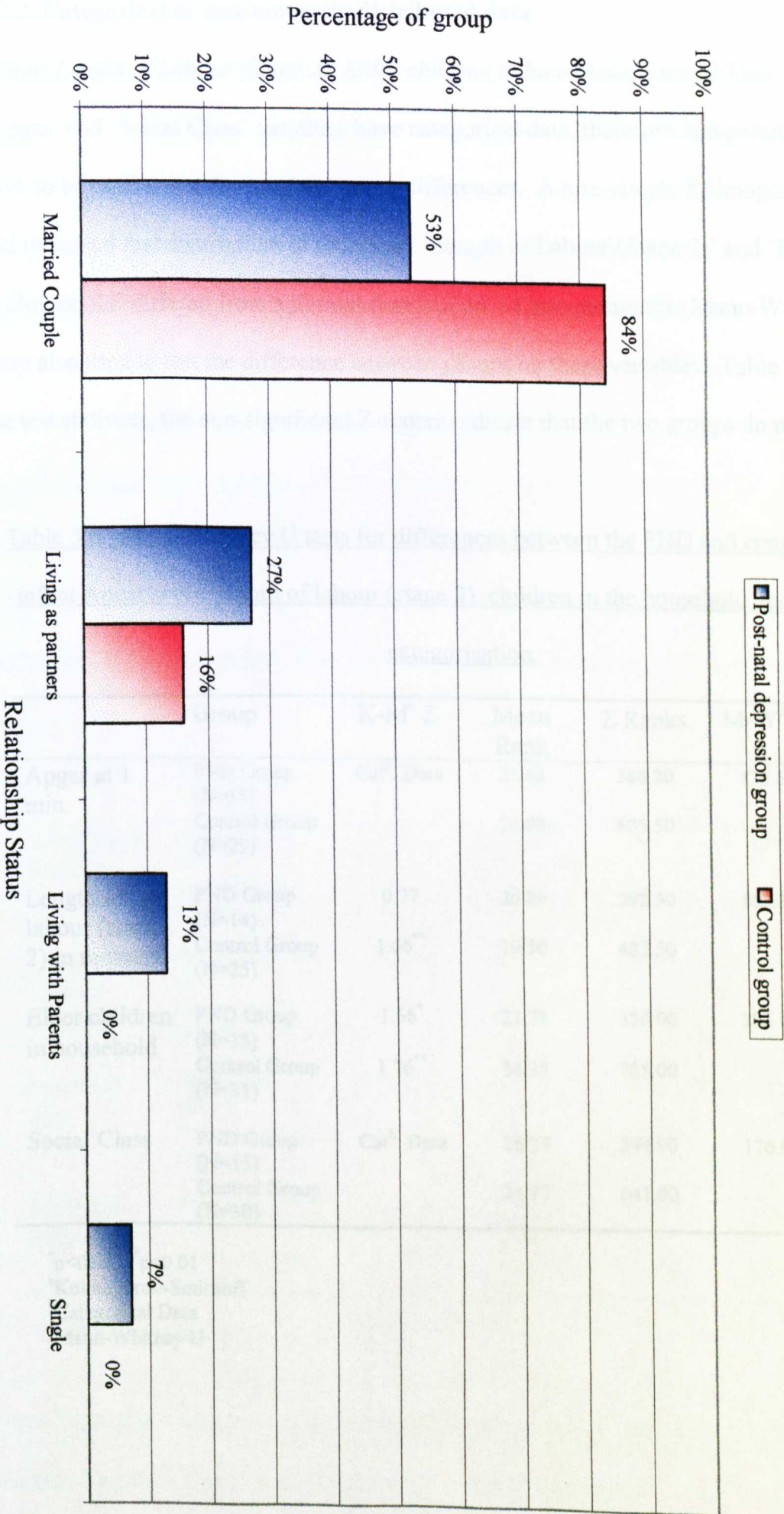
Table 3.5. Number of male and female infants, and the number of women having anaesthesia, in the two groups.

	Male Infants	Female Infants	TOTAL
PND group	10	5	15
Control group	16	15	31
TOTAL	26	20	46

	Anaesthesia	No-anaesthesia	TOTAL
PND group	4	11	15
Control group	12	18	30
TOTAL	16	29	45

Figure3.2. Relationship status categories for the post-natal depression and control groups, presented as group percentages.



3.2.2. Categorical or non-normally distributed data

*Apgar, Length of Labour (Stage 2), Elder children in household, Social Class.*

‘Apgar’ and ‘Social Class’ variables have categorical data, therefore non-parametric tests have to be used to test for between-group differences. A one-sample Kolmogorov-Smirnoff test indicated that distribution of scores for ‘Length of Labour (Stage 2)’ and ‘Elder Children in Household’ differed from a normal distribution, so non-parametric Mann-Whitney U tests were also used to test the difference between groups on these variables. Table 3.6 summarises the test statistics, the non-significant Z-scores indicate that the two groups do not differ.

Table 3.6. Mann-Whitney U tests for differences between the PND and control groups on infant Apgar score, length of labour (stage 2), children in the household and social class categorisation.

	Group	K-M <sup>a</sup> Z	Mean Rank	Σ Ranks	M-W <sup>c</sup> U	Z
Apgar at 1 min.	PND Group (N=15)	Cat <sup>b</sup> . Data	25.63	384.20	170.50	-1.23
	Control Group (N=29)		20.88	605.50		
Length of labour (stage 2) in minutes	PND Group (N=14)	0.77	20.89	292.50	162.50	-0.37
	Control Group (N=25)	1.66**	19.50	487.50		
Elder children in household	PND Group (N=15)	1.56*	21.73	326.00	206.00	-0.71
	Control Group (N=31)	1.76**	24.35	755.00		
Social Class	PND Group (N=15)	Cat <sup>b</sup> . Data	26.27	394.00	176.00	-1.29
	Control Group (N=30)		21.37	641.00		

\*p<0.05; \*\*p<0.01  
<sup>a</sup>Kolmogorov-Smirnoff  
<sup>b</sup>Categorical Data  
<sup>c</sup>Mann-Whitney U

3.2.3. Normally Distributed Data

*Infant Birth Weight, Length of Labour (Stage 1), Maternal Age, Maternal Education.*

Using a one-sample Kolmogorov-Smirnoff test, the distribution of data for each of the above variables was tested for normality, for each of the two groups. The test was non-significant for all four variables, indicating that the distributions of data did not differ from a normal distribution. This permitted the use of parametric tests, and an independent samples t-test was used to determine if there were significant differences between the two groups on these variables. Table 3.7 summarises these statistics, the *t* values indicate that there were no significant differences between the two groups on any of these variables.

Table 3.7. Independent sample *t* tests to determine differences between the PND and control group on infant birth weight, length of labour (stage 1), maternal age and length of maternal education.

Variable	Group	K-S <sup>a</sup> Z	Mean Score	SD	Levine's Test	<i>t</i>
Infant Birth Weight	PND Group (N=15)	0.86	3.62	0.44	0.94	1.17
	Control Group (N=31)	0.60	3.43	0.55		
Length of Labour (Stage 1)	PND Group (N=14)	1.05	344.29	200.75	2.64	1.33
	Control Group (N=25)	0.93	476.04	338.56		
Maternal Age	PND Group (N=15)	0.42	30.71	5.45	0.05	0.79
	Control Group (N=30)	0.71	32.05	5.38		
Maternal Education	PND Group (N=15)	0.82	14.33	2.87	1.69	0.75
	Control Group (N=30)	1.08	14.93	2.33		

<sup>a</sup>Kolmogorov-Smirnoff

These tests, taken together show that the PND and control groups do not differ on any of the presented measures, except EPDS scores (8 weeks postpartum).

### 3.3. Data Set

#### **3.3.1. Number of Weekly Interviews**

The data set for analysis of Regression Periods was 755 weekly interviews. Twenty-five interviews were not completed. Of these twenty-five, 13 were because written questionnaires were not returned, 9 were because participants went away and could not be contacted, and 3 were due to missed telephone calls.

All results presented below are based on the infants' gestational age and unless indicated, only data collected between weeks 12 to 26 post 'due-date' are presented (644 interviews).

#### **3.3.2. Identification of Regression Periods & Inter-rater Reliability**

Regression Periods-M/-IB were determined using the two methods outlined in Section 2.7.1. & 2.7.2. This resulted in two data sets:

- Uncorrected – based on the Plooij algorithm, no corrections for illness.
- Corrected – based on the categorisation of weeks as: 'normal', 'regression (-IB)', 'immunisation' (in the absence of illness), 'illness', after Plooij algorithm results and interview notes were scrutinised.

No inter-rater reliabilities were warranted for the 'uncorrected' data set because a clear algorithm (Figure 1.1.) was used. For the 'corrected' data set, an independent rater carried out the categorisation on a randomly selected sub-set of twenty participant's complete data.

Cohen's Kappa was calculated to determine the inter-rater reliability for these categorisations.

Table 3.8 shows the agreement for the two raters for the categorisation.



Table 3.8. Summary of categorisations of weeks as ‘normal’, ‘regression’, ‘immunisation’ and ‘illness’ by the two raters, for the purposes of calculating inter-rater reliabilities.

		Rater 1				
		Normal	Regression	Immunisation	Illness	TOTAL
Rater 2	Normal	162	5		4	171
	Regression	16	74		6	96
	Immunisation	2	1	18		21
	Illness	4			37	41
	TOTAL	184	80	18	47	329

Table 3.8. shows that Rater 2 classed 16 weeks as ‘regression’ that Rater 1 classed as ‘normal’. Apart from this there appears to be very good agreement between the raters, which is reflected in a Cohen’s Kappa value of 0.81 (Standard Error 0.03). This indicates ‘almost perfect’ reliability (Landis & Koch, 1977).

Given that this categorisation was sufficiently reliable, the complete data set was analysed to determine the impact of ‘illness’ and ‘immunisations’ on weeks categorised, using the Plooij algorithm, as Regression Weeks-IB. This was tested using a chi-squared test, and the table of frequencies appears in Table 3.9. It can be seen that the number of weeks that infants had immunisations, which were also Regression Weeks-IB, is at the expected level, confirmed with a non-significant chi-squared result ( $\chi^2(1)=0.00$ , non-significant). However, for ‘illness’ categorisations, considerably more illness weeks were also categorised as Regression Weeks-IB, this is confirmed with a highly significant chi-squared result ( $\chi^2(1)=18.54$ ,  $p<0.01$ ). These results indicate ‘illness’ weeks should be removed from the data set to limit false positives, but there was no indication that ‘immunisation’ weeks should be removed.

Table 3.9. Weeks categorised by raters as ‘Immunisation’ or ‘Illness’ and their co-incidence with Regression Week-IB (using the Plooij algorithm).

	Immunisation	No immunisation	TOTAL
Regression-IB	33	259	292
No regression	50	388	438
TOTAL	83	647	730

	Illness	No illness	TOTAL
Regression-IB	62	230	292
No regression	43	395	438
TOTAL	105	625	730

As a check, a Hierarchical Cluster Analysis (See Section 2.7.2) was performed on the ‘uncorrected’ data set of each participant individually, which provides an additional way of assessing the reliability of the categorisation. A further reliability analysis was performed, with the weeks categorised as ‘regression’ (by the raters) against the weeks identified as interpreted as ‘regression’ during the cluster analysis; Cohen’s Kappa was calculated to be 0.69 (Standard Error 0.03) indicating ‘substantial’ agreement (Landis & Koch, 1977), confirming the reliability of the categorisation system.

In the following sections, results are presented from both the ‘uncorrected’ and ‘corrected’ data sets. The ‘uncorrected’ data potentially contain more false-positives, whereas the ‘corrected’ data potentially contain more false-negatives. The two methods differ in the way that regression weeks are determined. However, to avoid confusion in the text, the labels Regression Week-M (mother’s subjective rating) and Regression Week-IB (specific infant behaviours) are used to refer to regression weeks for both data sets; the data set is always specified.

**3.3.3. Statistics Calculated for Results Section**

Five statistics are calculated from the data (12-26 weeks) for each participant:

<b>Weeks</b>	The total number of weeks that the participant was interviewed.
<b>Sum</b>	The total number of weeks, for each participant, which reached the criteria for Regression Week-M/-IB.
<b>Number of Periods</b>	The number of discrete clusters of weeks which can be classified as Regression Periods-M/-IB. The Regression Period-M/IB starts when a week is categorised as a Regression Week-M/IB and the preceding week is not; consecutive weeks are included, until a week which is not categorised as a Regression Week-M/IB is reached. Regression Periods-M/IB are by definition a minimum of one week long and a maximum of 15 weeks.
<b>Mean Length</b>	The mean length of Regression Periods-M/IB. This is calculated as <b>(Sum/Number of Periods)</b>
<b>Proportion</b>	The percentage of the total number of weeks, which meet the criteria for Regression Week-M/IB. This is calculated as <b>(Sum/Weeks)</b> .

**3.3.4. Data Set for Facilitators & Regulators Questionnaire**

The data set for the Facilitators & Regulators questionnaire was 43 interviews. Two interviews could not be done, in one case the participant had moved and not left details of her new address, the other interview could not be completed by the time this report was written.

In addition to the categorisation of questionnaire/interview responses by the interviewer, an independent rater categorised the transcripts of 30 randomly selected interviews. Table 3.10 displays the agreement between the two raters.

**Table 3.10. Inter-rater agreement over the categorisation of responses to each question of 30 randomly selected Facilitators & Regulators Questionnaire/Interviews**

		<b>Rater 1 (Score 0-4)</b>					<b>TOTAL</b>
		0	1	2	3	4	
<b>Rater 2 (Score 0-4)</b>	0	14	3				17
	1	3	48	4			55
	2		5	37	4		46
	3			1	26	1	28
	4					4	4
	<b>TOTAL</b>	17	56	42	30	5	150

Cohen's Kappa was calculated for these data as 0.81 (Standard Error 0.04) indicating 'almost perfect' agreement (Landis & Koch, 1977), and suggesting that the categorisation was reliable.

### **3.4. Summary Data for Variables relating to Hypotheses**

A large amount of data was collected during this project. For reasons of space, however, only results directly relevant to the hypotheses will be presented.

#### **3.4.1. Regression Periods-M**

Table 3.11. presents the data for the PND and control groups for the calculated variables, 'weeks', 'sum', 'number of periods', 'mean length' and 'proportion', based on Regression Periods-M. Displayed are the means, SD and range of scores.

Table 3.11. The five variables calculated from Regression Weeks-M, for the PND and control groups, using the ‘uncorrected’ and ‘corrected’ data sets.

	Weeks	Sum	Number	Mean	Proportion
PND group	13.67 <sup>a</sup>	5.53	3.80	1.47	0.41
‘uncorrected’	1.40 <sup>b</sup>	1.77	0.86	0.41	0.13
(N=15)	(11-15) <sup>c</sup>	(3-9)	(3-5)	(1.00-2.33)	(0.21-0.64)
Control group	14.16	4.52	2.61	1.66	0.32
‘uncorrected’	1.21	2.16	0.96	0.64	0.16
(N=31)	(11-15)	(0-9)	(0-4)	(0-3)	(0.00-0.73)
PND group	13.67	4.40	3.20	1.37	0.32
‘corrected’	1.40	1.96	1.08	0.43	0.14
(N=15)	(11-15)	(1-9)	(1-5)	(1.00-2.25)	(0.07-0.64)
Control group	14.16	3.61	2.52	1.36	0.26
‘corrected’	1.21	2.09	1.24	0.52	0.16
(N=31)	(11-15)	(0-8)	(0-5)	(0-2.67)	(0.00-0.73)

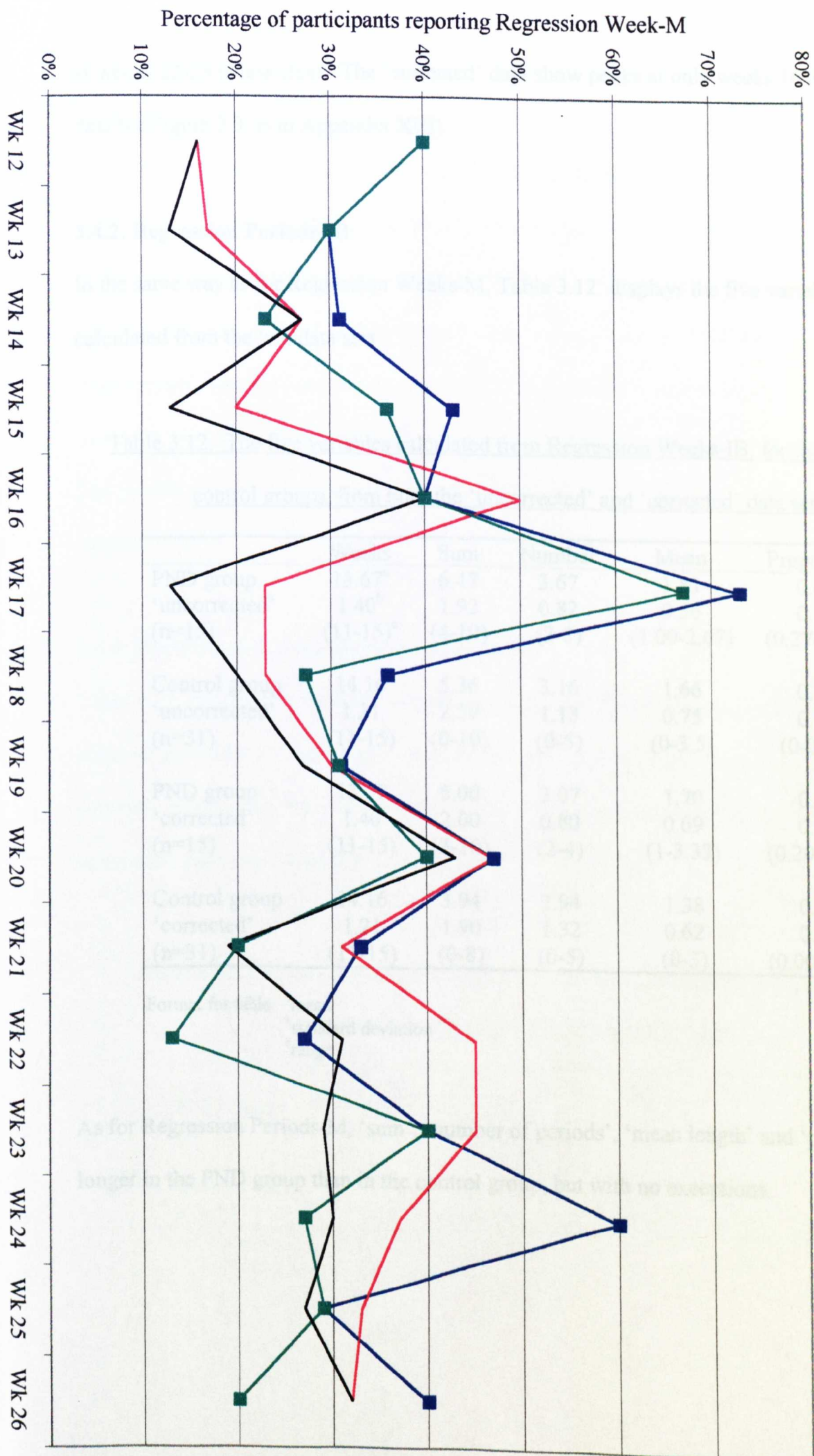
Format for table: <sup>a</sup>mean  
<sup>b</sup>standard deviation.  
<sup>c</sup>(range)

Table 3.11 shows that data were collected for fewer weeks for the PND group, that ‘sum’, ‘number of periods’, ‘mean length’, and ‘proportion’ are higher for the PND group with the exception of ‘mean length’ which is longer in the control group on the ‘uncorrected’ data.

*Variations in the proportion of participants reporting Regression Weeks-M across 15 weeks of the study (weeks 12-26)*

Figure 3.3 displays the percentage of participants reporting Regression Weeks-M across 15 weeks of the study. Presented are the results from both the ‘uncorrected’ and ‘corrected’ data sets. This figure shows that there are peaks in the percentage of participants reporting Regression Weeks-M at weeks 17, 20 and 24 for the PND group when the ‘uncorrected’ data are used, and at weeks 17, 20 and 23, when the ‘corrected’ data are used. For the control group, using the ‘uncorrected’ data, the peaks are at weeks 16, 20 and 22-23, though the peak

Figure 3.3. The percentage of participants reporting Regression Week-M, over 15 weeks of the study. Presented are data from both data sets and for the PND and control group.



at weeks 22-23 is less clear. The ‘corrected’ data show peaks at only weeks 16 and 20 (the data for Figure 3.3. is in Appendix XIII).

3.4.2. Regression Periods-IB

In the same way as for Regression Weeks-M, Table 3.12. displays the five variables calculated from the two data sets.

Table 3.12. The five variables calculated from Regression Weeks-IB, for the PND and control groups, from both the ‘uncorrected’ and ‘corrected’ data sets.

	Weeks	Sum	Number	Mean	Proportion
PND group	13.67 <sup>a</sup>	6.47	3.67	1.81	0.47
‘uncorrected’	1.40 <sup>b</sup>	1.92	0.82	0.56	0.12
(n=15)	(11-15) <sup>c</sup>	(4-10)	(2-5)	(1.00-2.67)	(0.27-0.67)
Control group	14.16	5.36	3.16	1.66	0.38
‘uncorrected’	1.21	2.59	1.13	0.75	0.18
(n=31)	(11-15)	(0-10)	(0-5)	(0-3.5)	(0-0.67)
PND group	13.67	5.00	3.07	1.70	0.37
‘corrected’	1.40	2.00	0.80	0.69	0.13
(n=15)	(11-15)	(3-10)	(2-4)	(1-3.33)	(0.20-0.67)
Control group	14.16	3.94	2.94	1.38	0.28
‘corrected’	1.21	1.90	1.32	0.62	0.14
(n=31)	(11-15)	(0-8)	(0-5)	(0-3)	(0.00-0.73)

Format for table: <sup>a</sup>mean  
<sup>b</sup>standard deviation  
<sup>c</sup>range

As for Regression Periods-M, ‘sum’, ‘number of periods’, ‘mean length’ and ‘proportion’ are longer in the PND group than in the control group, but with no exceptions.

*Variations in the proportion of participants reporting Regression Weeks-IB across 15 weeks of the study (weeks 12-26)*

Figure 3.4 displays the percentage of participants reporting Regression Weeks-IB across 15 weeks of the study. The figure presents the results from both the ‘uncorrected’ and ‘corrected’ data sets. This figure shows that there are peaks in the percentage of participants reporting Regression Weeks-IB at weeks 14-15, 17 and 24 for the PND group when the ‘uncorrected’ data are used, and at weeks 14-15, 17 and 25, when the ‘corrected’ data are used. For the control group, using the ‘uncorrected’ data, the peaks are at weeks 16 and 20. The ‘corrected’ data show peaks at 12, 14, 16, 20 and 24 (the data table for Figure 3.4 is in Appendix XIV).

**3.4.3. Facilitators & Regulators Questionnaire.**

Table 3.13. summarises the data from the Facilitators & Regulators questionnaire. The summed scores for the whole questionnaire are displayed as ‘Total’, also displayed are the summary statistics for the individual questions. This questionnaire produces categorical data, so median scores are presented.

Table 3.13. Median Scores and Range of Scores from Facilitators and Regulators

<u>Questionnaire for the PND and control groups.</u>						
	Total	Q.1	Q.2	Q.3	Q.4	Q.5
PND Group (N=14)	9.5 <sup>a</sup> (7-13) <sup>b</sup>	2 <sup>a</sup> (1-4) <sup>b</sup>	2 <sup>a</sup> (1-2) <sup>b</sup>	3 <sup>a</sup> (3-3) <sup>b</sup>	1 <sup>a</sup> (0-2) <sup>b</sup>	1.5 <sup>a</sup> (0-2) <sup>b</sup>
Control Group (N=29)	8 <sup>a</sup> (2-11) <sup>b</sup>	2 <sup>a</sup> (1-4) <sup>b</sup>	1 <sup>a</sup> (0-3) <sup>b</sup>	3 <sup>a</sup> (0-4) <sup>b</sup>	1 <sup>a</sup> (0-2) <sup>b</sup>	1 <sup>a</sup> (0-2) <sup>b</sup>

<sup>a</sup>Median.  
<sup>b</sup>Range.



Figure 3.4. The percentage of infants reported to have Regression Periods-IB, over 15 weeks of the study. Presented is data from the PND and control groups, and both the 'uncorrected' and 'corrected' data sets.

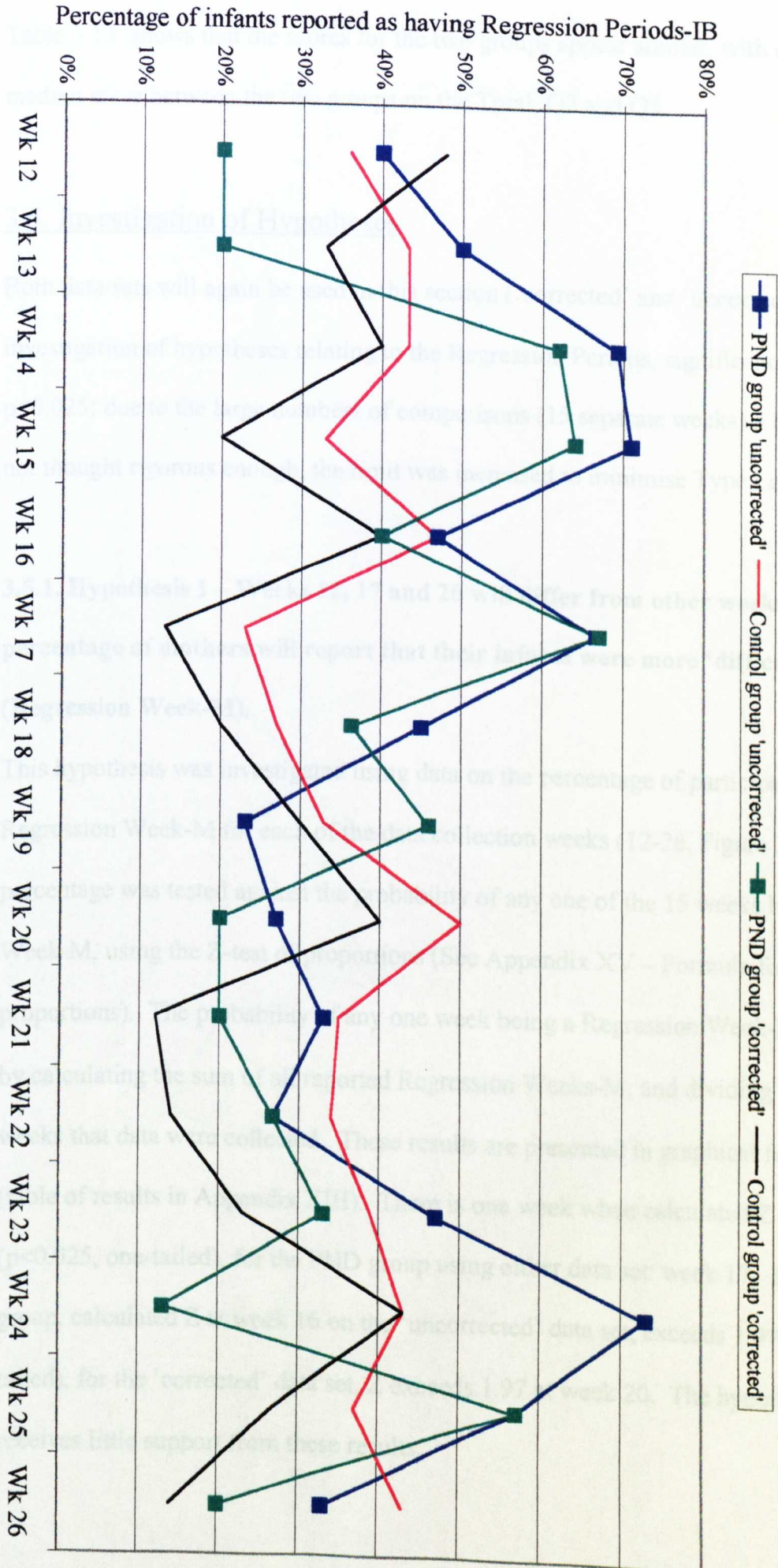


Table 3.13. shows that the scores for the two groups appear similar, with differences in median score between the two groups on the Total, Q2 and Q5.

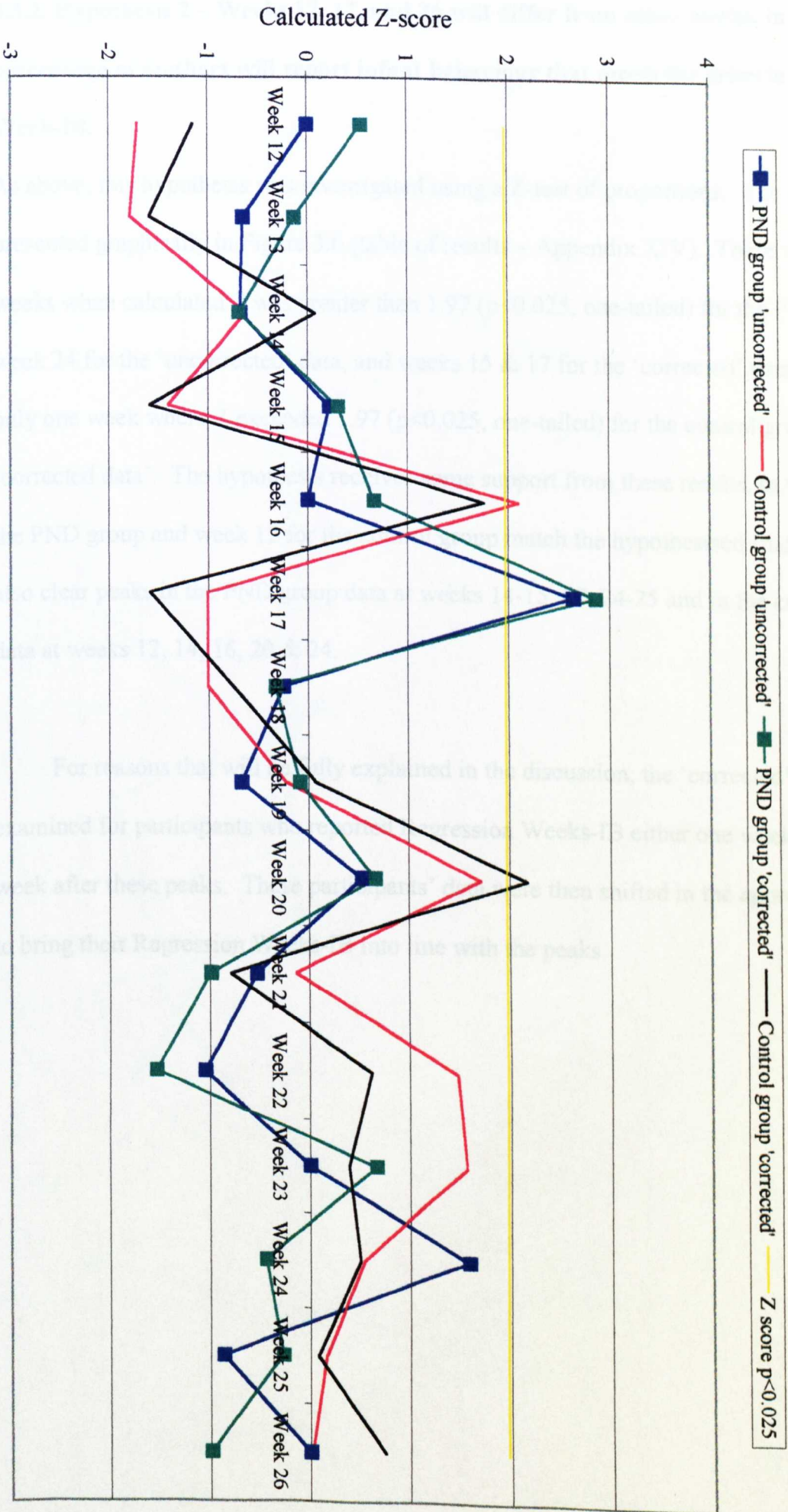
### 3.5. Investigation of Hypotheses

Both data sets will again be used in this section ('corrected' and 'uncorrected'). For the investigation of hypotheses relating to the Regression Periods, significance limits were set at  $p < 0.025$ ; due to the large numbers of comparisons (15 separate weeks) a limit of  $p < 0.05$  was not thought rigorous enough, the limit was increased to minimise Type I errors.

#### **3.5.1. Hypothesis 1 – Weeks 12, 17 and 26 will differ from other weeks, in that a higher percentage of mothers will report that their infants were more 'difficult/tiresome' (Regression Week-M).**

This hypothesis was investigated using data on the percentage of participants who reported a Regression Week-M for each of the data collection weeks (12-26, Figure 3.3.). This percentage was tested against the probability of any one of the 15 weeks being a Regression Week-M, using the Z-test of proportions (See Appendix XV – Formula for Z-test of proportions). The probability of any one week being a Regression Week-M was determined by calculating the sum of all reported Regression Weeks-M, and dividing by the number of weeks that data were collected. These results are presented in graphical form in Figure 3.5 (table of results in Appendix XIII). There is one week when calculated Z is greater than 1.97 ( $p < 0.025$ , one-tailed), for the PND group using either data set: week 17. For the control group, calculated Z at week 16 on the 'uncorrected' data set, exceeds 1.97 ( $p < 0.025$ , one-tailed), for the 'corrected' data set, Z exceeds 1.97 at week 20. The hypothesis therefore receives little support from these results.

Figure 3.5. Calculated Z-scores (Z-test of proportions) for Regression Weeks-M, for the PND and control groups using both data sets.



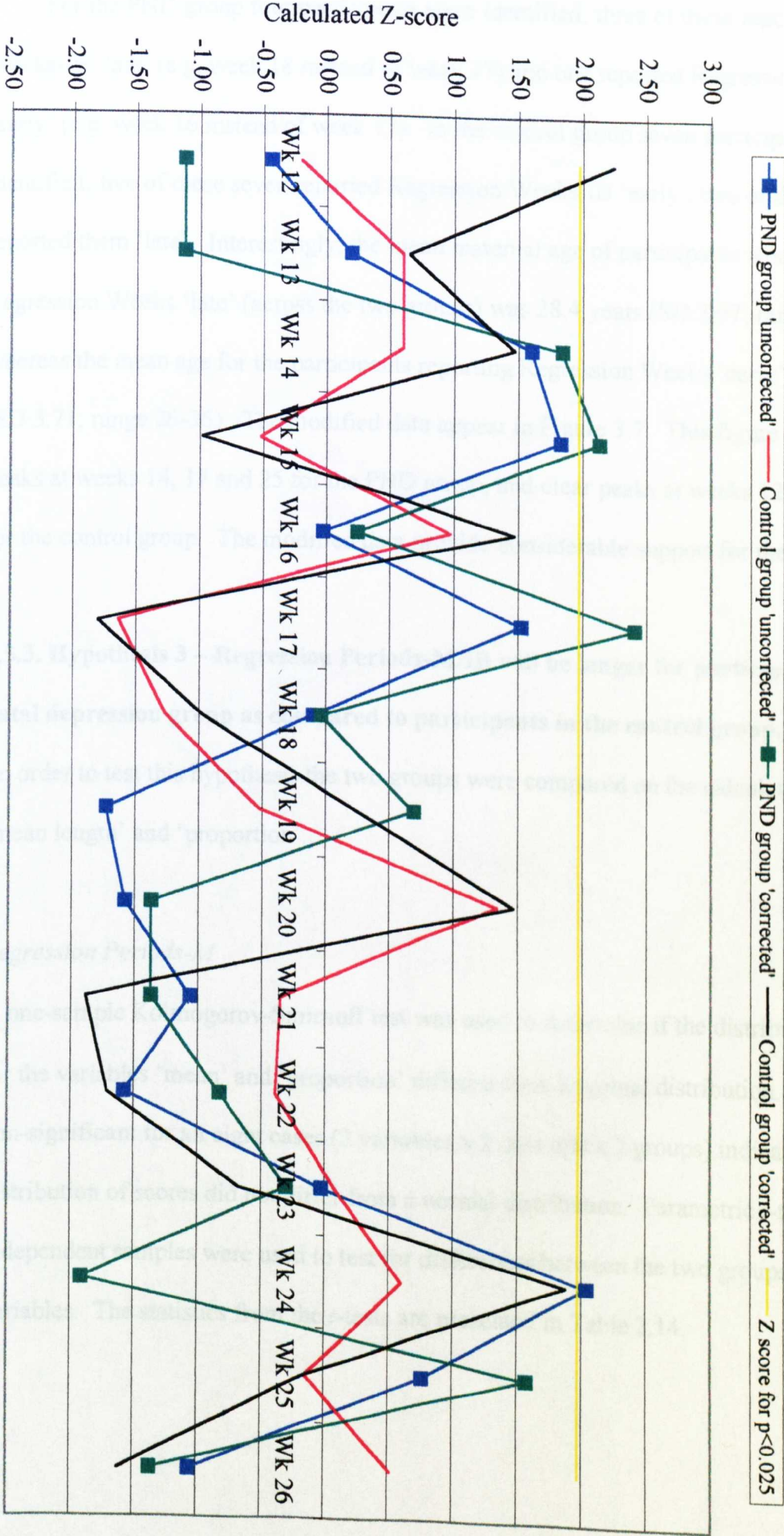
### **3.5.2. Hypothesis 2 – Weeks 12, 17, and 26 will differ from other weeks, in that a higher percentage of mothers will report infant behaviour that meets the criteria for Regression Week-IB.**

As above, this hypothesis was investigated using a Z-test of proportions. The results are presented graphically in Figure 3.6 (table of results – Appendix XIV). There were three weeks when calculated Z was greater than 1.97 ( $p < 0.025$ , one-tailed) for the PND group, at week 24 for the ‘uncorrected’ data, and weeks 15 & 17 for the ‘corrected’ data. There was only one week where Z exceeded 1.97 ( $p < 0.025$ , one-tailed) for the control group: week 12, ‘corrected data’. The hypothesis receives some support from these results, in that week 17 for the PND group and week 12 for the control group match the hypothesised findings. There are also clear peaks in the PND group data at weeks 14-15, 17, 24-25 and in the control group data at weeks 12, 14, 16, 20 & 24.

For reasons that will be fully explained in the discussion, the ‘corrected’ data set was examined for participants who reported Regression Weeks-IB either one week before or one week after these peaks. These participants’ data were then shifted in the appropriate direction to bring their Regression Weeks-IB into line with the peaks.



Figure 3.6. Calculated Z scores (Z-test of proportions) for Regression Weeks-1B for the PND and control groups using both data sets.



For the PND group four participants were identified; three of these reported Regression Weeks-IB 'late' (e.g. week 18 instead of week 17) and one reported Regression Weeks-IB 'early' (e.g. week 16 instead of week 17). In the control group seven participants were identified; five of these seven reported Regression Weeks-IB 'early', two of the seven reported them 'late'. Interestingly, the mean maternal age of participants who reported Regression Weeks 'late' (across the two groups) was 28.4 years (SD 3.97; range 22-31), whereas the mean age for the participants reporting Regression Weeks 'early' was 32.2 years (SD 3.71; range 26-36). The modified data appear in Figure 3.7. This figure shows clear peaks at weeks 14, 17 and 25 for the PND group, and clear peaks at weeks 12, 16, 20 and 24 for the control group. The modified data provide considerable support for the hypothesis.

### **3.5.3. Hypothesis 3 – Regression Periods-M/IB will be longer for participants in the post-natal depression group as compared to participants in the control group.**

In order to test this hypothesis the two groups were compared on the calculated measures 'mean length' and 'proportion'.

#### *Regression Periods-M*

A one-sample Kolmogorov-Smirnoff test was used to determine if the distribution of scores for the variables 'mean' and 'proportion' differed from a normal distribution. This test was non-significant for all eight cases (2 variables x 2 data sets x 2 groups) indicating the distribution of scores did not differ from a normal distribution. Parametric *t*-tests for independent samples were used to test for differences between the two groups on these variables. The statistics from the *t*-tests are presented in Table 3.14.

Figure 3.7. Calculated Z-scores (Z-test of proportions) for Regression Weeks-1B on the 'corrected' data, after data has been modified for participants reporting Regression Weeks-1B 'early' or 'late'.

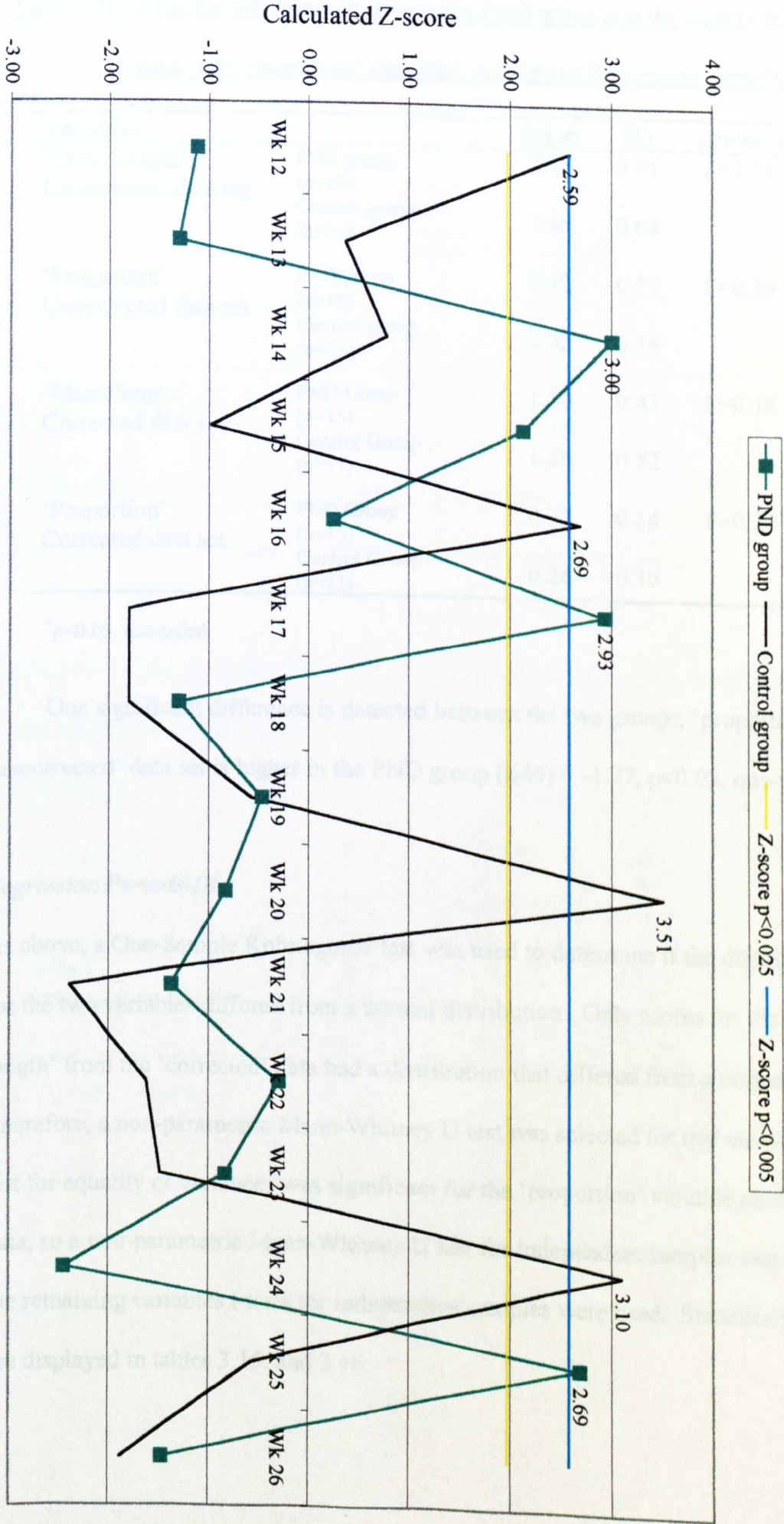


Table 3.14. *t*-test for differences between the PND group and the control group on ‘mean length’ and ‘proportion’ variables, relating to Regression Periods-M.

Variables		Mean	SD	Levine’s	<i>t</i>
‘Mean length’ Uncorrected data set	PND group (n=15)	1.46	0.41	F=2.76	1.09
	Control group (n=31)	1.66	0.64		
‘Proportion’ Uncorrected data set	PND group (n=15)	0.40	0.12	F=0.59	-1.77*
	Control group (n=31)	0.32	0.16		
‘Mean length’ Corrected data set	PND Group (n=15)	1.37	0.43	F=0.16	-0.07
	Control Group (n=31)	1.36	0.52		
‘Proportion’ Corrected data set	PND Group (n=15)	0.32	0.14	F=0.20	-1.36
	Control Group (n=31)	0.26	0.16		

\* $p < 0.05$ , one-tailed

One significant difference is detected between the two groups; ‘proportion’ on the ‘uncorrected’ data set is higher in the PND group ( $t(44) = -1.77$ ,  $p < 0.05$ , one-tailed).

### *Regression Periods-IB*

As above, a One-Sample Kolmogorov test was used to determine if the distribution of scores for the two variables differed from a normal distribution. Only scores for the variable ‘mean length’ from the ‘corrected’ data had a distribution that differed from a normal distribution. Therefore, a non-parametric Mann-Whitney U test was selected for this variable. Levine’s test for equality of variances was significant for the ‘proportion’ variable on the ‘uncorrected’ data, so a non-parametric Mann-Whitney U test for independent samples was again used. For the remaining variables t-tests for independent samples were used. Statistics for these tests are displayed in tables 3.15. and 3.16.



Table 3.15. *t*-test statistics for differences between the PND group and the control group on ‘mean length’ and ‘proportion’ variables for Regression Periods-IB.

Variables		Mean	SD	Levine's	<i>t</i>
‘Mean length’ Uncorrected data set	PND group (n=15)	1.81	0.56	F=0.23	-0.69
	Control group (n=31)	1.66	0.76		
‘Proportion’ Corrected data set	PND group (n=15)	0.37	0.13	F=0.05	-1.94*
	Control group (n=31)	0.28	0.14		

\*p<0.05, one-tailed

The PND and control groups differ on the ‘proportion’ variable, calculated from the ‘corrected’ data set, ‘proportion’ is significantly higher in the PND group.

Table 3.16. Mann-Whitney U test statistics to detect differences between the PND group and the control group, on ‘mean length’ and ‘proportion’ variables for Regression Period-IB.

Variables		Mean Rank	Σ Ranks	M-W U	Z
‘Proportion’ Uncorrected data set	PND group (n=15)	28.33	656.00	160.00	-1.70*
	Control group (n=31)	21.16	425.00		
‘Mean’ Corrected data set	PND group (n=15)	28.13	659.00	163.00	-1.68*
	Control group (n=31)	21.26	422.00		

\*p<0.05, one tailed

Both tests yield significant results. The PND and control groups differ on both the ‘proportion’ and ‘mean length’ variable using the ‘corrected’ data. ‘Proportion’ and ‘mean length’ are both larger in the PND group on either data set. These results provide support for the hypothesis.

**3.5.4. Hypothesis 4 – Participants in the post-natal depression group will score higher on the Facilitators & Regulators questionnaire, reflecting a more ‘Regulatory’ style of mothering.**

The Facilitators & Regulators questionnaire (Raphael-Leff, 1991) collects categorical data. For this reason non-parametric tests were used to determine the significance of differences between the two groups on this measure. The Mann-Whitney U test for independent samples was selected. In addition to determining if the groups differed on the overall summed-total for the questionnaire, each of the five questions were also analysed. All test results appear in Table 3.17.

**Table 3.17. Mann-Whitney U tests for between-group differences on the Facilitator and Regulator Questionnaire (Raphael-Leff, 1991).**

	N	Mean Rank	$\Sigma$ Ranks	M-W U	Z
Total					
PND group	14	29.54	413.50	97.50	-2.77***
Control group	29	18.36	532.50		
Q.1 Routines					
PND group	14	26.68	31.50	179.50	-0.67
Control group	29	21.19	614.50		
Q.2 Feeding					
PND group	14	26.64	373.00	138.00	-1.90*
Control group	29	19.76	573.00		
Q.3 Communication					
PND group	14	28.00	392.00	119.00	-2.63***
Control group	29	19.10	554.00		
Q.4 Individuation					
PND group	14	23.93	335.00	176.00	-0.77
Control group	29	21.07	611.00		
Q.5 Integration					
PND group	14	27.57	386.00	125.00	-2.16**
Control group	29	19.31	560.00		

\* $p < 0.05$ , \*\* $p < 0.02$ , \*\*\* $p < 0.005$ . All probabilities are one-tailed.

The above results indicate that the two groups differ significantly on the overall measure and also on specific questions Q2, Q3 & Q5. These results support the hypothesis.

### 3.6. Additional Analyses

#### **3.6.1. Temporal Relationship between the two groups' Regression Weeks-IB.**

The pattern of Z-scores for the PND and control group after the 'shifting modification' (Figure 3.7.) suggests that the PND group have their Regression Weeks-IB 'one week late'. In order to test this observation, a correlation was planned. The distribution of Z-scores for the two groups was first tested using a one-sample Kolmogorov-Smirnoff test. This test was non-significant, indicating that the distribution of Z-scores did not differ from a normal distribution. A Pearson's correlation was selected to test the similarity of the two group's Z-scores. Two correlations were calculated: Z-scores as they appear in Figure 3.7; Z-scores shifted one week, i.e. control group Week 12, against PND group Week 13.

The calculated  $r$  for the first correlation was  $-0.17$  ( $N=15$ , non-significant). The calculated  $r$  for the second correlation was  $0.42$  ( $N=14$ ,  $p<0.07$  one-tailed). This second correlation approaches significance and provides some support for the observation that the PND group have their Regression Periods 'one week late'.

#### **3.6.2. Length of Specific Regression Periods-IB.**

The final analysis involved determining the length of the Regression Periods, which occurred at the times identified using the Z-test of proportions (Figures 3.7.). If a participant reported a Regression Week-IB, which coincided with one of these identified 'peak-weeks', the length of the Regression Period-IB (of which the Regression Week-IB was part) was calculated (as for 'mean length'). The mean Regression Period-IB length was then calculated and the results for the two groups appear in Figure 3.8. The figure shows that the first two Regression

Periods were longer in the PND group (weeks 12-14 & 16/17). By the final Regression Period (week 24/25) a marked lengthening for the control group coincides with a shortening for the PND group.

The difference between the two groups in Regression Period-IB length was also tested. Mann-Whitney U tests were used because the distribution of data differed from a normal distribution (tested using one-sample Kolmogorov-Smirnoff). Table 3.18. presents summary statistics for these tests. The tests show that the second Regression Period (week 16/17) is significantly longer for the PND group than for the control group.

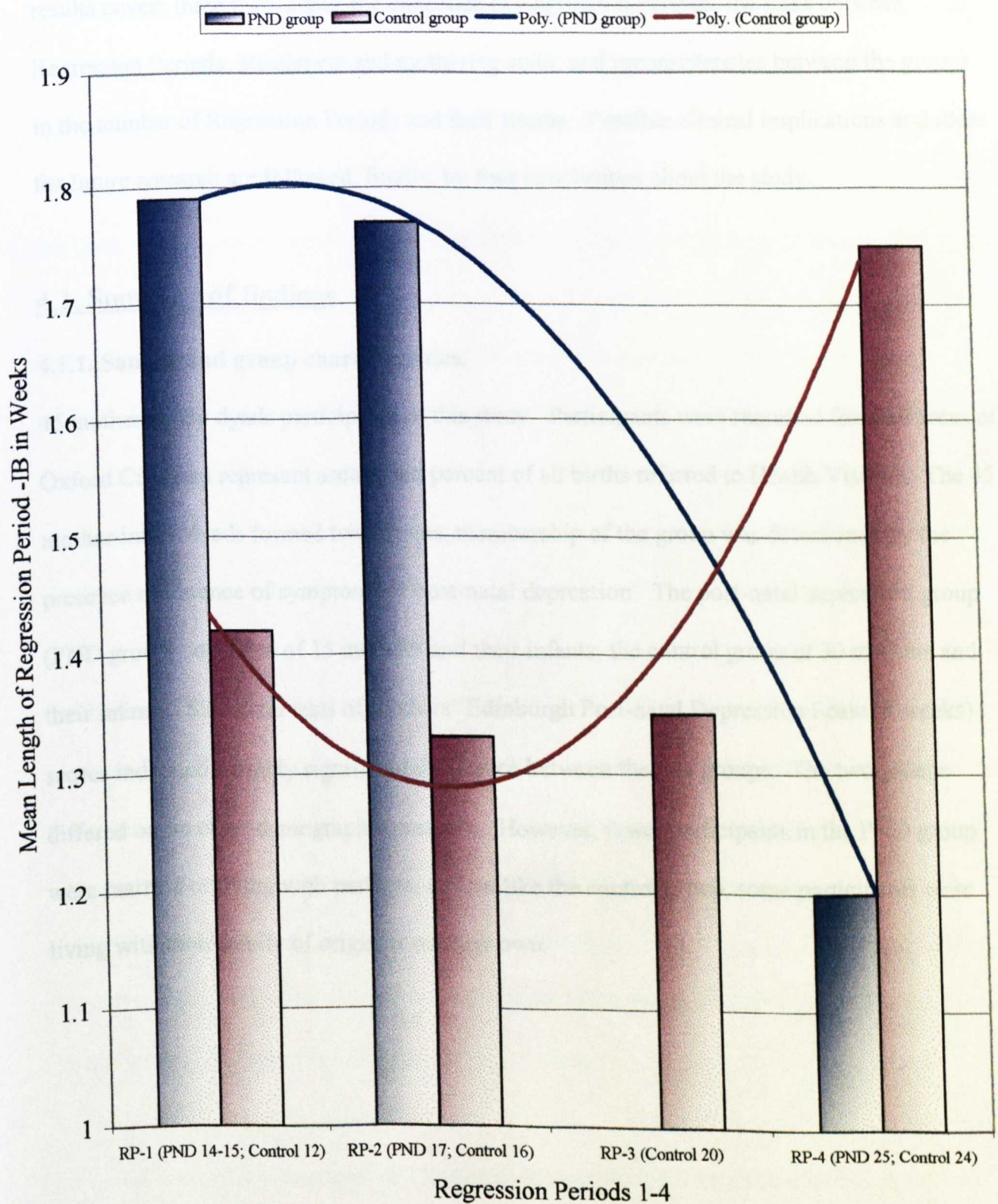
Table 3.18. Mann-Whitney U test summary for between group differences on Regression

Period length.

		Mean Rank	Σ Ranks	M-W <sup>a</sup> U	Z
Regression Period 1	PND group (N=12)	14.17	170.00	52.00	-1.28
	Control group (N=12)	10.83	130.00		
Regression Period 2	PND group (N=11)	16.23	178.50	52.50	-1.75*
	Control group (N=15)	11.50	172.50		
Regression Period 4	PND group (N=10)	11.20	112.00	57.00	-1.44
	Control group (N=16)	14.94	239.00		

\*p<0.05, one tailed  
\*Mann-Whitney U

Figure 3.8. The length of Regression Periods-IB, for those participants reporting them during the identified peaks, for the PND and control groups, based on the 'shifted', 'corrected' data. Polynomial trend lines have been plotted.



## 4. Discussion

This section will start with a summary of findings. Methodological issues will then be discussed followed by a section on the interpretation of the results. The interpretation of results covers three main areas: the existence of Regression Periods; the links between Regression Periods, attachment and mothering style; and inconsistencies between the groups in the number of Regression Periods and their timing. Possible clinical implications and ideas for future research are followed, finally, by four conclusions about the study.

### 4.1. Summary of findings

#### **4.1.1. Sample and group characteristics.**

45 mother-infant dyads participated in this study. Participants were recruited from all areas of Oxford City, and represent around ten percent of all births referred to Health Visitors. The 45 mother-infant dyads formed two groups, membership of the group was determined by the presence or absence of symptoms of post-natal depression. The post-natal depression group (PND group) consisted of 15 mothers and their infants; the control group of 30 mothers and their infants. Statistical tests of mothers' Edinburgh Post-natal Depression Scale (8 weeks) scores indicated a highly significant difference between the two groups. The two groups differed on no other demographic measure. However, fewer participants in the PND group were married or living with partners, and, unlike the control group, some participants were living with their family of origin or on their own.

**4.1.2. Hypothesis 1 – Weeks 12, 17 and 26 will differ from other weeks, in that a higher percentage of mothers will report that their infants were more ‘difficult/tiresome’ (Regression Week-M).**

Based on the work of van de Rijt-Plooij & Plooij (1992), it was expected that there would be peaks in the percentage of participants reporting that they had found their infants particularly tiresome (Regression Weeks-M) at approximately weeks 12, 17 and 26. The findings from this study are that one peak, at week 17, is found for the PND group when either data set is used. For the control group a peak at week 16 is found when the uncorrected data set is used, the same peak is found for the corrected data set, but in this case is non-significant. The control group also has another distinct peak at week 20, which is significant when the corrected data set is analysed and present, but non-significant, when the uncorrected data set is used. This indicates that there are distinct times when mothers are reporting that their infants are more difficult/tiresome. In relation to the hypothesis, there is support for the Regression Period-M at week 16/17, but the data do not support the existence of the two other Regression Periods-M (12 & 26 weeks).

**4.1.3. Hypothesis 2 – Weeks 12, 17, and 26 will differ from other weeks, in that a higher percentage of mothers will report infant behaviour that meets the criteria for Regression Week-IB.**

Statistically significant peaks in the percentage of participants reporting Regression Weeks-IB (regression weeks defined by specific infant behaviours) occurred for the PND group at week 24 on the uncorrected data set, and at weeks 15 & 17 on the corrected data set. For the control group only one peak was significant, at week 12.

When selected participants' data (whole time series) were shifted one week (either ‘forwards’ – week 12 shifted to week 13, or ‘backwards’ week 13 shifted to week 12) relative

to other participants, a much stronger pattern emerged. For the PND group there were three peaks, at weeks 14, 17 and 25. For the control group there were four peaks at weeks 12, 16, 20 and 24. These findings support the hypothesis.

#### **4.1.4. Hypothesis 3 – Regression Periods-M/IB will be longer for participants in the post-natal depression group as compared to participants in the control group.**

##### *Regression Periods-M.*

The mean average length of Regression Periods-M was longer for the control group using the uncorrected data set, though longer for the PND group using the corrected data set. Neither of these differences were statistically significant, which suggests that there are no differences in the mean length of Regression Periods-M between the two groups.

The variable ‘proportion’ reflects the percentage of weeks classed as Regression Weeks-M/IB for each participant. The mean of ‘proportion’ for Regression Weeks-M for the PND group was always higher than that for the control group, and this difference was statistically significant using the uncorrected data. However, the uncorrected data may contain more false-positives; this difference may therefore be due to increased frequency of illness in the PND group (See Section 4.2.5.).

##### *Regression Periods-IB.*

The mean average length of Regression Periods-IB was longer in the PND group using both data sets. This difference was not statistically significant using the uncorrected data set, but was statistically significant when the corrected data set was used. More weight is given to the finding on the ‘corrected’ data set; these data contain fewer false-positives and are viewed as more accurately reflecting the occurrence of Regression Periods (See Section 4.2.5.). This finding supports the hypothesis that Regression Periods would be longer in the PND group.



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## 4.2. Methodological Issues

### **4.2.1. Sample Size**

The intended sample for this project was:

PND group:                30 primiparous mothers meeting the criteria for Depressive Episode  
with post-natal onset

Control group:            30 primiparous mothers.

Power calculations, based on estimates of group mean differences and standard deviations, were made during the planning phase of the project. The calculations indicated that between 17 and 40 participants per group were required to achieve statistically significant results. This calculation refers only to Hypothesis 3.

Early in the project it was necessary to abandon the primiparous criterion. The project had tight and rigid time constraints and the primiparous criterion was abandoned because relatively fewer than expected mothers were being referred.

The low number of participants referred may be related to the fact that no participant referred by the Health Visitors chose to not take part in the study and once in none dropped out. So the low number of participants may indicate that Health Visitors were selective about whom to introduce the study to, and this may have prevented prospective participants from being referred. Although all participants are attributed to their Health Visitors, two prospective participants requested to take part, as their friends were already participating in the project. There are therefore selection biases in this sample in addition to other factors in the sample, e.g. a skew towards Social Class I.

The clarity of information given to the Health Visitors by myself may have been a factor relating to the early difficulties in participants being referred. Some Health Visitors were initially unsure when to start to refer mothers to the project, there was also some confusion over whether they were supposed to refer only mothers with symptoms of post-natal depression, or all mothers. These misunderstandings were corrected during the individual meetings with Health Visitors.

This small, heterogeneous, selected sample means that interpretations of findings and conclusions should be made cautiously. The smaller than expected sample size may mean that some between-group differences are not statistically significant. The sample also has a bias toward high social economic class.

#### **4.2.2. Gestational Age and missed data.**

van de Rijt-Plooij & Plooij (1992), do not make it absolutely clear that gestational age of the infant is used to determine the timing of Regression Periods; however, their use of gestational age was later confirmed (Plooij, 1997). During the planning phase of the project, this issue was not considered. All the timings for this project were based on infants' age from date of birth. This resulted in discrepancies in the number of weeks that data were collected. For example, when prospective participants were referred slightly late, i.e. during the infant's 12<sup>th</sup> week and the infant was also two weeks overdue, the study could only start during the infant's 15<sup>th</sup> week – based on gestational age.

#### **4.2.3. Telephone based data collection.**

When written questionnaires were used in this study (at Easter and Christmas) there were striking differences between participants in the amount of information recorded. This ranged from "Y" or "N" written next to questions with no elaboration at all, to twenty-word answers

for each question. Also, the largest source of avoidable data-loss was through written questionnaires not being returned. Telephone interviews allowed full answers to each question to be obtained, information from the questions was put into context and information additional to that required by the questions was often volunteered, for example moves of house, changes in day care arrangements, and stresses in the household. Mothers reported being far happier with telephone calls. The written notes that were made during the calls proved invaluable in the determination of 'illness' weeks. The notes were also very much appreciated by the mothers, when they were presented to them in the form of a booklet at the end of the study.

#### **4.2.4. The Regression Period Interview.**

Although not appreciated during the planning stage of the project, there appear to be some shortcomings in some aspects of this interview. These flaws fall into the following categories:

- English-Dutch translation of questions.
- Comparative or Present/Absent questions.
- Anxiety provoking questions.
- Automatic response questions.

#### *English-Dutch translation.*

van de Rijt-Plooi and Plooi (1992) include the questionnaires that they used in their study as an appendix to their paper. These questionnaires are printed in English. There appears to be a key error in their translation, relating to a critically important question. In the determination of Regression Weeks-M, one question is used, "Did you find your infant more tiresome this week?" The key phrase in the question refers to whether *mothers found their infants* more tiresome. The Dutch version of this question uses the word "Hangerig". This word has a

slightly different meaning to the English translation of ‘tiresome’. Instead of mothers experiencing the infant as more tiresome, the Dutch word relates to *mothers ascribing* a feeling of ‘tiresome-ness’ or ‘difficult-ness’ or ‘out of sorts-ness’ to their infants, alternatively the infant is a source of concern *for the mother*. The question may capture the essence of the original Dutch question if it is rephrased as “Do you think that your infant is having a difficult week this week?”

The question, as it was asked in this study, “Did you find your infant more tiresome this week?”, remains a useful question, although it is not valid to compare the findings from Regression Weeks-M (determined using this question) in this study, from that of the original Dutch study.

#### *Comparative or Present/Absent questions.*

There appear to be at least two different sorts of question that make up the Regression Period Interview. Examples of these two types of question are:

“Has your infant been crying more often this week (as compared to last week)?”

“Has your infant demanded to be picked up this week?”

The first question requires a comparison to be made between behaviour observed during the last seven days, and the seven days which preceded that. The second form of question simply asks if the infant has demonstrated a particular behaviour. Interpretation of the interview data should acknowledge this difference.

*Stress provoking questions.*

Certain participants became unsettled when some questions were asked. Examples of these sorts of question include:

“Has your baby laughed or smiled more often this week?”

“Have you been able to make any time for yourself this week?”

“Have you picked your baby up when s/he has wanted you to, more often this week?”

Mothers often asked if they differed from other participants in their responses to these questions. Some mothers also seemed very reluctant to make responses that could be interpreted as them having difficulties looking after their infant. These factors may mean that some mothers are reluctant to report ‘difficult’ infant behaviours, and this may impact on the detection of Regression Periods. However, it should be added that a strength of the telephone interview, as opposed to written questionnaires, was that this reluctance could be picked up.

*Automatic Answer questions.*

It became clear that most participants responded to specific questions in the same way, week after week, an example is:

“Has your baby been sucking his/her hand/fingers more often this week?”

The questionnaire could be shortened with little loss of detail by removing these questions.

At least two participants also responded with exactly the same answer each week to the question “On a 0-10 scale, where would you rate your mood this week?” The reasons for this may be reluctance on the part of some mothers to acknowledge that their mood may influence

their interactions with their infant. It may also be that some participants thought that their competence in looking after their child was under scrutiny.

#### **4.2.5. False Positives and False Negatives.**

This issue has been considered carefully during this project, and at the risk of being cumbersome two methods of analysing the data have been used throughout the study. van de Rijt-Plooij and Plooij (1992; Plooij, 1997) acknowledge that a key difficulty in determining a Regression Period involves differentiating regression behaviour from illness, or behaviour stemming from a disruption to the household. In an attempt to address this issue weeks were categorised as 'illness' or 'regression'. The key criterion for 'illness' was that there must have been clear physical signs of illness: elevated temperature, diarrhoea, spots/rashes. Snuffles or runny nose were not counted as illness. A high inter-rater reliability indicates that it was possible to reliably make judgements about symptoms of illness. However, it is still possible that Regression Weeks may coincide with physical illness. A psychoneuro-immunological perspective would be that during Regression Periods, the infant experiences higher levels of stress, leaving the infant more vulnerable to infection/illness. Plooij & van de Rijt-Plooij (1988) have presented data that suggest that the incidence of childhood illness is not normally distributed in the first year of life, with peaks at week 12 and 24 amongst others.

An additional difficulty relates to 'teething'. Teething symptoms were cited as reasons for temperamental infant behaviour from as early as 12 weeks. Despite this, only three infants cut teeth during the course of the study. Certainly, 'teething' may trigger behaviour that is similar to regression behaviour, it is also possible that mothers are wrongly attributing regression behaviour to 'teething'. The issue of attribution, as it relates to Regression Periods, is discussed briefly in Section 4.5.2.

When the two data sets (uncorrected & corrected) are compared, the corrected data set is more likely to accurately reflect Regression Periods. This is because there should be fewer false-positives<sup>7</sup>, as 'illness' weeks have been removed. More analyses have been performed on the 'corrected' data set, e.g. the 'shifting' modification (See section 4.1.3.4.) because of this. In the interpretation of results more weight will be given to the findings on the corrected data. However, in the attempt to limit false positives, the corrected data set may now contain a larger number of false negatives. The uncorrected data are retained to provide some balance between the two.

### 4.3. Interpretation of Findings

#### 4.3.1. The Existence of Regression Periods.

van de Rijt-Plooij and Plooij (1992), reported that at weeks 12, 17 and 26 a high percentage of infants were reported to be more difficult/tiresome. During the same weeks, infants displayed behaviour that could be reliably categorised as indicative of a Regression Period (this study Regression Weeks-IB). During these weeks there was impressive agreement across participants, with as much as 90% agreement as to when these Regression Periods occurred. The data analysis described in Section 1.2.2. showed that the Regression Period at week 17, extends from week 16-18. Plooij (1998) comments that the duration of the Regression Period at week 12 was one-week, but ranged from 1-6 weeks for the Regression Periods at week 17 and 26.

Lindahl, Heimann & Ullstadius (in preparation), studied a Swedish population using identical methods to van de Rijt-Plooij & Plooij (1992). They presented data that support the

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<sup>7</sup> False Positives – weeks wrongly classed as Regression Periods because behaviour from another cause, e.g. illness, produced behaviour patterns indistinguishable from regression behaviour.



existence of Regression Periods at weeks 10-11, 14-17, and 20-21. Their data do not support the existence of a Regression Period at week 26. When these two studies are taken together, the picture emerges that there are potentially Regression Periods at weeks 10-12, 14-18, 20-21, & 26. It should be noted that in their study of four infants, de Weerth & van Geert (1998) did not replicate the existence of any Regression Periods, however doubt has been cast on the sensitivity of their methodology and selection of participants (Cools, 1998).

The two confirmatory studies have followed 29 infants through the period of 12-26 weeks postpartum (corrected for gestational age). The current study has followed 46 infants through the same time period. In this study the method of data collection differed from the two previous studies, using an arguably more sensitive method of data collection – the telephone interview. This method elicits more comprehensive, accurate, contextualised information. Thus, this study has the largest sample size, with arguably the more sensitive method of data collection.

#### **4.3.1.1. Difficulties in Comparison – Use of statistical tests.**

There is a difference in methodology across studies of Regression Periods, relating to statistical analysis. In this study, peaks are determined using statistical tests, whereas in previous studies they have been identified where a high percentage of participants report similar behaviour. One criticism of these studies is that a high percentage of participants reporting similar behaviour does not take into consideration the ‘background probability’<sup>8</sup> that any one week is a Regression Week-IB. For example in the Lindahl *et al.* (in preparation)

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<sup>8</sup> ‘Background probability’ – if the probability that any one week is a Regression Week, is 0.45, then only a small fluctuation in the percentage of reported Regression Weeks would be needed for a peak to be identified,

study, the criterion for a Regression Week is 'greater than 50 per cent agreement across participants'. Using this methodology, the higher the background probability that a week is a Regression Week-IB, the more likely that it will reach a pre-determined criterion, e.g. 50%. The opposite is true in the current study.

#### 4.3.1.2. Regression Periods-M

Neither Lindahl *et al.*, (in preparation) or de Weerth & van Geert (1998) report findings relating to Regression Periods-M. The only study for comparison is therefore, van de Rijt-Plooij & Plooij (1992). However, as has already been mentioned, there are doubts over the translation of the key question, which makes comparisons problematic.

In this study, certain weeks clearly had a comparatively high percentage of participants reporting Regression Periods-M. For the PND group week 17, for the control group two peaks exist, at weeks 16 and 20. The finding at week 16/17 is in line with van de Rijt-Plooij and Plooij (1992). However, in this study Regression Week-M reflects mothers finding their infants tiresome. It is more logical to see this as supporting evidence for the timing and existence of Regression Periods-IB.

The hypothesis relating to Regression Weeks-M has not been adequately tested during this study. The absence of evidence for Regression Weeks-M at weeks 12 or 26 can not be interpreted as failing to provide support for their existence, as a differently focused methodology has been adopted.

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i.e. as above 0.50. However if the probability is much lower, say 0.20 a peak at 0.50 would, more than likely be statistically significant.

#### 4.3.1.3. Regression Periods-IB.

As has been stated above, the two confirmatory studies, when taken together indicate that Regression Periods-IB occur at weeks 10-12, 14-18, 20-21 & 26. The findings of this study are that when the uncorrected and corrected data sets are examined, statistically significant peaks – high percentages of participants reporting behaviour categorised as Regression Periods-IB – occur at weeks 15, 17 and 25 for the PND group and at week 12 for the control group.

##### *Post-natal depression group*

For the PND group the peaks at week 15 & 17 coincide with the Regression Period-IB at weeks 14-18 in the literature. However, in this study, there is a clear separation between the peaks at week 15 & 17, suggesting that they are two separate Regression Periods. It seems probable that the Regression Period-IB detected at week 25, coincides with that found at week 26 in the van de Rijt-Plooij & Plooij (1992) study. However, these findings are made up from two different data sets (corrected & uncorrected). No one data set matches the pattern of Regression Periods-IB of the confirmatory studies.

##### *Control group*

Some support for the hypothesis comes from the corrected data set for the control group, with a peak at week 12 clearly coinciding with those found in previous studies. When simply the (non-significant) peaks are examined there is some evidence for Regression Weeks-IB at weeks 12, 14, 16, 20 and 24 based on the corrected data. This provides good agreement with the findings of previous studies. A further modification was also made to the data, by moving the data forwards or backwards along the time line, i.e. week 12 shifted to week 13, or week 13 shifted to week 12. The following section discusses this modification.

#### 4.3.1.4. Shifting data by one week in either direction.

This modification was first undertaken by de Weeth & van Geert (1998) in their replication study of van de Rijt-Plooij & Plooij (1992). Although they provided no rationale for doing so, it is proposed that there are three relevant factors that support this modification.

##### *1. Inaccuracies over date of conception.*

Due dates are typically calculated from the date of the last menstruation before becoming pregnant, and are often confirmed by an ultra-sound scan at 12 weeks. There are opportunities for error and inaccuracies over the calculation of infants' due dates based on these variables. For example, there may be variations in the exact date of fertilisation. In addition, due dates used in this study were provided by participants, there is the possibility for error over the exact due date and some mothers were provided with a range, i.e. 18-20<sup>th</sup> September.

##### *2. Inaccuracies over length of gestation.*

Typically, due dates are based on Naegle's rule (McGinnis, 1996). This rule is based on the assumption that human gestation lasts the equivalent of ten menstrual cycles. It has been demonstrated that the length of human gestation is influenced by several factors, including race, age of mother, and previous births (Mittendorf *et al.*, 1993). For example, Mittendorf *et al.*, (1993) have shown that the length of gestation for white primiparous mothers is typically seven days shorter than would be expected using Naegle's rule. In this study, when the mean age of participants whose data had been shifted up (from 12 to 13), was compared with the ages of participants whose data had been shifted down, from (13 to 12), they differed by approximately 4 years. This age difference could relate to the length of gestational period for the mothers, and provide a rationale for modifying the data.

### *3. Individual Infant Characteristics*

Temperament, difficulties during delivery, or early illnesses may all have an effect on infants' developmental progress, which may include Regression Periods.

When these three factors are considered, it is possible that the exact due date (used in this study to 'time' the Regression Periods) could vary by several days. It should also be considered that the unit of measurement for the timing of Regression Periods is a seven-day-week. This means that some infants are shifted by as much as three days. For example, if an infant is twelve weeks postpartum on the 18<sup>th</sup> September and the telephone call takes place on the 22<sup>nd</sup> September, the call could be classed as occurring during the infant's twelfth or thirteenth week. Given that there exist so many sources of error about babies' precise gestational age, it is proposed that the shifting of data by one week in either direction is within reasonable limits. It should also be made clear that it is not just 'a week' that is shifted, but the whole time-series. Given that this yields a clearer pattern of results, it suggests that once each infant has the same 'real zero point' the intervals between Regression Periods fall into a pattern.

When these modifications are made to the data, by shifting only four cases for the PND group and seven cases for the control group, very significant results are produced.

#### **4.3.1.5. Results based on the modified 'shifted' 'corrected' data set.**

Figure 3.7 displays these results graphically. For the PND group there are statistically significant peaks at weeks 14, 17 and 25. For the control group the peaks are at weeks 12, 16, 20 and 24. The pattern that the PND group have their Regression Periods a 'week late' does not quite reach significance, and is an unexpected finding.

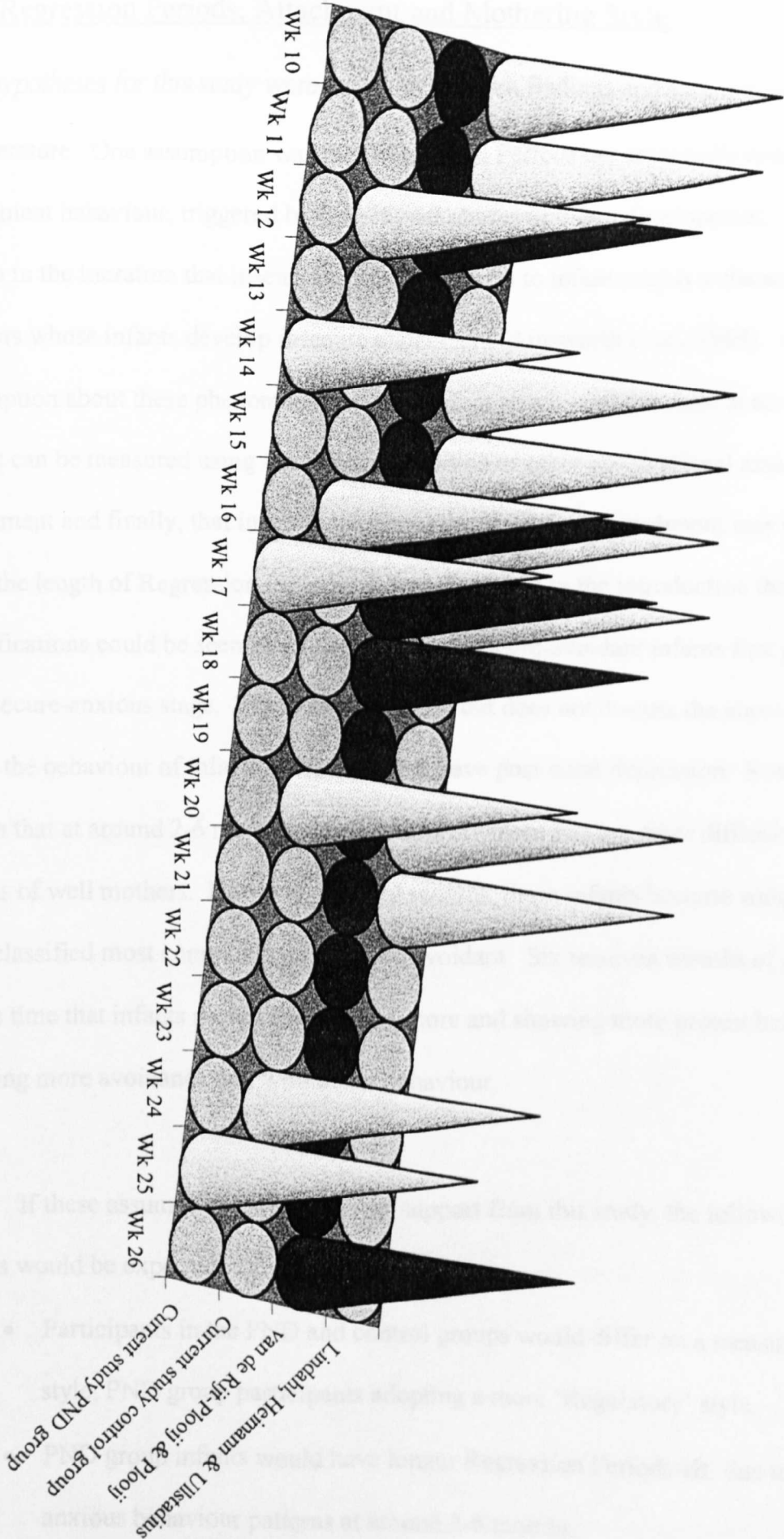
These findings offer support for Hypothesis 2, and substantially replicate the findings of both van de Rijt-Plooij & Plooij (1992) and Lindahl *et al.* (in preparation). Taken collectively, the timing of Regression Periods for 75 infants have been investigated. Despite the fact that the studies have been undertaken in differing countries with cultural variations there exists a reasonable degree of similarity in the timings of Regression Periods, Figure 4.1 displays this similarity graphically. There appears to be increasingly strong empirical evidence supporting the existence of Regression Periods.

The findings of this study are statistically significant, however, even during the peaks, Regression Periods are only reported by 40-75% of participants. This may be because illness or other stressors are masking the detection of Regression Periods. Alternatively, it may be due to unreliability in the reporting of behaviour by mothers, or an insufficiently sensitive methodology.

#### *Cyclical Nature of Regression Periods.*

Control group Regression Periods occur at 4-week intervals in this study. The use of a multiple time-series design makes it impossible that external factors could be creating this pattern. One suggestion has been that the behaviour observed during Regression Periods is triggered by transitions in development. An alternative explanation is that mothers perceive their infants as more challenging during Regression Periods due to other factors, unrelated to infant development, for example menstrual cycles. This alternative explanation is not supported by the findings from Regression Periods-M; it would be expected that mothers would report their infants as more tiresome for all the Regression Weeks-IB.

Figure 4.1. The similarity in timings of Regression Periods-IB across the three confirmatory studies



## 4.2. Regression Periods, Attachment and Mothering Style.

The hypotheses for this study were based on research findings and assumptions derived from the literature. One assumption was that Regression Periods are essentially episodes of attachment behaviour, triggered by transitional phases in infant development. It has been shown in the literature that insensitive responsiveness to infant cues is a characteristic of mothers whose infants develop insecure attachment (Ainsworth *et al.*, 1969). A second assumption about these phenomena, was that infant attachment develops at an earlier stage than it can be measured using the Strange Situation or other observational assessments of attachment and finally, that information about the developing attachment may be extracted from the length of Regression Periods. It was discussed in the introduction that attachment classifications could be seen as sequential with Insecure-avoidant infants first passing through an Insecure-anxious stage. The literature notes, but does not discuss the anomalous findings about the behaviour of infants whose mothers have post-natal depression. Researchers have shown that at around 2-6 months, these infants cry more and are more difficult to settle than infants of well mothers. However, by 6-12 months, these infants become withdrawn and are later classified most commonly as Insecure-avoidant. Six to seven months of age appears to be the time that infants switch from crying more and showing more protest behaviour, to showing more avoidance and withdrawn behaviour.

If these assumptions are to receive support from this study, the following pattern of results would be expected:

- Participants in the PND and control groups would differ on a measure of mothering style, PND group participants adopting a more 'Regulatory' style.
- PND group infants would have longer Regression Periods-IB, due to Insecure-anxious behaviour patterns at around 2-6 months.



- Over the course of the study the length of Regression Periods for the PND group would peak before six months.

The results from this study are that PND group participants differ from control group participants in their responses on the Facilitators & Regulators questionnaire, the differences are related to feeding, infant-mother communication and integration of the infant in to the household routine. This difference in mothering style may indicate that participants in the PND group are less flexible and so less sensitive to their infants' moods than participants in the control group. This may be particularly relevant given that infant behaviour during Regression Periods may be perceived as unpredictable and uncontrollable. It has also been determined that the PND group report longer Regression Periods-IB (Section 3.5.3.) than the control group. And that there is a difference between the PND and control groups in the 'mean length' of individual Regression Periods-IB (Section 3.6.2.). Additionally, there is a trend in the length of Regression Periods-IB (See Figure 3.8): the duration of the first two Regression Periods-IB for the PND is longer than for the control group – this difference is reversed for the Regression Period-IB at week 24/25. The increase in Regression Period-IB length for the control group may reflect the increased range for the duration of Regression Periods, reported by Plooij (1998).

These results tend to support the assumptions that Regression Periods reflect the developing infant-mother attachment. Two key pieces of information are essential to make more firm statements about the data.

Firstly, assessments of temperament. The individual and group differences in length of Regression Period may be better explained by differences in temperament. However, time and resource constraints prevented measures of temperament being taken.

Secondly, Strange Situation (Ainsworth & Wittig, 1969) assessment of attachment. In the absence of clear assessment of attachment, the link between Regression Periods and attachment classifications is not established. Attachment classifications should be made on the infants, and correlated with the infants' individual Regression Period pattern. It would be expected that the infants with brief Regression Periods would be classified as Insecure-avoidant and infants with long Regression Periods would be classified as *Insecure-anxious*. The possibility of following up the participants from this study has been discussed and all mothers have expressed an interest in being contacted again to complete a Strange Situation assessment.

The findings of this study will be better contextualised and some of the conclusions may have to be changed in the light of any new information.

#### 4.3. Inconsistencies in the number of Regression Periods and their timing

Figure 3.7 clearly shows that control group has an additional peak week 20. This Regression Period has been identified by Lindahl *et al.* (in preparation) but was not detected by van de Rijt-Plooij & Plooij (1992). When the two groups are compared there is even a non-significant decrease in the percentage of PND group participants reporting Regression Weeks-IB at week 20. There does not appear to be any clear reason as to why the two groups may differ at this time. The very high Z-score of 3.51 ( $p < 0.0005$ ) indicates that it is unlikely to be a chance finding.

In Section 3.6.1., a correlation aimed to determine if participants in the PND group had their Regression Periods-IB 'one week late'. This correlation was non-significant, probably due to the control group peak at week 20. Again, there is no clear interpretation of this finding; it was not predicted. One possible interpretation relates to cognitive

development. Hay (1997) reviews current research findings on the effect of post-natal depression on infant development. He identifies three studies which have investigated the link between post-natal depression and cognitive development: Murray (1992); Hay & Kumar, 1995; Sharp, Hay, Pawlby, Schmucker, Allen & Kumar (1995). Murray's (1992) study showed clear deficits on object permanence tasks at 9 and 18 months for infants whose mothers had post-natal depression. Hay & Kumar (1995) and Sharp *et al.* (1995) demonstrated that there were negative effects of maternal post-natal depression on infants' cognitive development, which was predictive of poorer performance on reliable measures of childrens' abilities at four years. Importantly these differences were not related to pre- or peri-natal risk factors, but there are social class and gender influences, with boys performing less well than girls, and social class serving as a protective factor.

These findings suggest that even early in infancy, maternal post-natal depression impacts on infant development and leads to weaker performance on tests of cognitive development. Relating these findings to the current study, one interpretation of the (non-significant) 'one week late' pattern is that it reflects a delay in cognitive development. If Regression Periods are viewed as markers of early development, passing through Regression Periods late indicates a relative delay in cognitive development. One suggestion is that environmental factors – specifically post-natal depression in the mother, may impact directly on infant development, which is measurable through delays in the occurrence of Regression Periods, and could be supported by testing infants' cognitive development and comparing these two sources of data. However, a simple argument against these speculative suggestions is that the 'delay' is only approximately one week, and it seems improbable that this would have a detectable impact on infant development.

## 4.4. Clinical Implications

The practical implications of this study relate more to service development and prevention interventions, than to individual clinical applications. Four key areas where the findings of this study could be applied are:

- Information for parents & professionals
- Parenting interventions
- Preventative interventions and support for families with a high risk of abuse
- Individual work with mothers with post-natal depression

### **4.4.1. Information for Parents & Professionals.**

The phenomenon of Regression Periods in early infancy is gaining empirical support. Information about possible times when infants will be more demanding may prove very valuable to new parents, for whom the first year after the birth of a child is full of new stresses and adaptations. A key aspect of Regression Periods is 'crying for no reason'. Aversive events over which an individual has little control are by definition stressful. Information about alternative explanations for baby's difficult behaviour may not have any impact on baby's behaviour but its parents may be able to adopt a different perspective on the crying and 'see baby's point of view'. Parents would also have information that baby is probably passing through a phase, and the notion that the crying will not go on forever may be of some comfort. Although no data are presented in support, it was noted during this study that anxious new parents frequently took their infants to emergency surgeries and GP clinics because they feared that their infants crying reflected illness or discomfort on the part of the child. Some parents also took to using medication, for example Calpol, because they interpreted the infant's crying as teething (see Section 4.5.2. on Attribution). Similarly, information about Regression Periods could be made available to Health Visitors, GPs and

other Primary Health Care workers, who could consider the timings of Regression Periods in relation to giving advice about illnesses and parenting.

#### **4.4.2. Parenting Interventions**

In addition to providing information about Regression Periods, the theoretical framework of attachment theory suggests parenting strategies. Using the notion of Regression Periods as a structure, parenting techniques could be explained at ante-natal classes or earlier. The link with attachment theory provides a rationale for sensitive parenting and suggests against the notion that baby will be spoilt if the parent picks the infant up too often.

#### **4.4.3. Preventative Interventions & Support for families with a high risk of abuse**

The timing of Regression Periods indicates when the most stressful periods for new parents are likely to be. Health Visitors and other professionals involved closely with vulnerable groups could structure their support to coincide with these difficult periods. If the attachment behavioural system is triggered during Regression Periods, providing support for parents so that they can parent their infant sensitively during these times may prevent the development of an insecure attachment. The unfortunate reality of these findings is that it is the mothers who are already finding caring for their infant challenging, because of their post-natal depression, who are getting a 'double dose' – their infant is more difficult to care for than that of a well mother. This vicious circle could be the target of intervention by providing information, support and advice during these potentially difficult times. An additional intervention would focus on mothers' interpretation of their infant's behaviour, if mothers interpret their infant as being 'difficult on purpose' this may heighten their risk of abusing their infant. van de Rijt-Plooij & Plooij (1993) report how mothers in their study were shocked by the realisation that they may harm their infants because of the stress of looking

after it. Thus, even in a very stable home environment, the stress of looking after an infant may precipitate an incident of abuse.

#### **4.4.4. Individual Clinical Work**

The Learned Helplessness theory of depression (Abramson, Seligman & Teasdale, 1978) provides a way of linking Regression Periods and post-natal depression. Regression Periods may be perceived by the mother as unpredictable periods of challenging infant behaviour. Mothers often report 'crying for no reason'. Thus, she may feel that whatever action she takes will have no effect on her infant's obvious distress. A clinical intervention could be informed by these findings and target cognitions relating to self-efficacy as a parent.

### **4.5. Future Research**

#### **4.5.1. Further Analysis of these data**

A large amount of information was collected during this project and a number of interesting investigations remain possible on these data, and include:

*Skills development.* The data include the timings of new skill developments, particularly 'milestones' such as: first smile, independent sitting, development of pincer grip. The two groups could be compared as to the timing of developmental milestones and this may inform the issue of impaired cognitive development.

*Development of RP Interview.* This data collection tool can be developed and possibly usefully shortened to target more specifically regression related behaviour.

*How mothers mood varied with the timing of Regression Periods.* This could be investigated by examining the responses to the question “How would you rate your mood on a 0-10 scale this week?”

*Attachment Categories and Further Regression Periods.* The groups can be followed up, and assessments made of cognitive development, attachment categories, and could also be contacted to determine the existence of additional Regression Periods identified by van de Rijt-Plooij & Plooij (1992).

#### **4.5.2. Future Studies**

##### *Attachment*

Further research could focus on identifying if there is a connection between Regression Periods and attachment; this has been outlined above. Many additional possibilities exist for examining the relationship between Regression Periods and attachment categories. Fonagy, Steele & Steele (1991) report fascinating findings of inter-generational patterns of attachment using the Adult Attachment Interview (AAI; George, Kaplan & Main, 1985). They have shown that parents’ attachment status, determined using the AAI reliably predicts infant security of attachment as measured on the Strange Situation. The AAI could provide a pool of parent-infant dyads at high risk of developing insecure attachment, and their Regression Period profiles could be investigated.

##### *Larger Study*

The number of Regression Period studies so far is understandably small because it is a very time-intensive methodology. However, if the method for detecting Regression Periods could be made more sensitive and less time-consuming it would be possible to undertake the sort of large scale study needed to confirm the existence of Regression Periods. As well as clinical

and service applications, study of Regression Periods offers a potentially powerful tool for understanding early infant development.

### *Attribution Theory & Cognitions*

Although no data are presented, one very interesting aspect of the study was mothers' understanding of what was happening to their infant during Regression Periods. Attribution theory offers one way of understanding mothers' explanations. Kelly (1967) suggests that when we investigate co-variation we use three key criteria: Distinctiveness, Consistency, and Consensus. Attribution theory can be used to understand how mothers explain their infant's unusually difficult behaviour. For example, they may search for *distinctive* events or situations when their infant is difficult. However, the infant must usually be difficult when this event occurs (*consistency*), and all infants must behave quite similarly (*consensus*). Since Regression Periods are not triggered by external stimuli (though they might be influenced by them) there are no consistent events. During the study it appeared that mothers placed more emphasis simply on *distinctive* events. These could often be a source of real concern, for example when the infant was particularly difficult with a new child minder, or when mother went back to work (although it is clear that these incidents on their own may trigger attachment behaviour). These attributions and their impact could be the focus of future research.

### 4.6. Conclusions

1. This study supports the existence of Regression Periods at approximately 12-14, 16-17, 20 and 24-25 weeks. However, the Regression Periods can be masked by illness or other disruptions. They were only detected after these factors were controlled for.



2. Participants in the PND group differed from the control group in that they more frequently reported Regression Weeks-IB, and the mean length of Regression Periods-IB was also longer. However, there was no difference between the two groups in reporting that the infant had been more tiresome.
3. Differences were found between the two groups in their responses to the Facilitators and Regulators Questionnaire. Indicating that PND group participants differed from control group participants in their mothering style.
4. This study is an attempt to link Regression Periods and attachment behaviour with different styles of mothering. Non-significant findings, linking these topics have been found. When mothers suffer from post-natal depression, their infants have longer Regression Periods, until around six months when they suddenly shorten. These infants also appear to have their Regression Periods later than infants of well mothers. These trends need to be confirmed by future studies. A follow up of participants in the present study plans to address the inter-relationship of Regression Periods, attachment behaviour and maternal post-natal depression.

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# Appendices

Appendix I	Letter to Health Visitors – beginning of study
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Dear Health Visitor,

I really appreciated you taking the time to listen to our research ideas. I'm glad that you think that this is a useful piece of work, and that you are willing to help us with this study.

We have tried to design the study so that you have the minimum inconvenience and time taken up by it. I've listed below the stages to the project, and how your input will be most valuable. If at any stage you have questions about the project, please contact me on the number above.

The first step of the project is to tell the new mothers about the study, and give them some background information. In practice this means that at the First Birth Visit, or soon after if you are visiting the family more often, you will give the Information Sheet to your client. Please give this information sheet to all your clients, as we want to achieve two groups, a postnatal depressed group, and a non-depressed control. We also want to interest women from all over the City to take part. If your client asks you questions you feel unable to answer, you can either prompt them to ring me, the number is on the Information Sheet, or you can ring me and feedback the answers to your client.

The second step will happen at least two weeks after this. We have to give the women a certain length of time to consider if they wish to take part. At around 6-8 weeks you will normally administer the Edinburgh Postnatal Depression Scale. When you administer this scale, please prompt the women if they have thought about taking part in the study. If they wish to continue, please make an entry on the form I have attached to this letter. This form includes the name of your client, her address and telephone number, her score on the EPDS, and importantly any additional information that you think we should know. When you have a client, her EPDS score, and her interest in the study you are welcome to ring me to alert me to this, or I will attempt to ring you weekly to ascertain if there are any clients interested in taking part.

The third step is that I will then make contact with your client, to answer any questions she may have about taking part, and then ask her to sign a consent form, indicating that she has understood the procedure for the study and is willing to continue her involvement - she is able to withdraw from the study at any stage. When this is all done, I will complete a structured interview with her to see if she should be in the non-depressed or the depressed group. We will also complete together a final questionnaire.

The main part of the study is that I will telephone her weekly for at least 16 weeks and ask a series of short questions. The questions concern her experience of looking after her baby, and some questions about what the baby has been doing. At the end of the study, I will complete a final questionnaire and thank her for her participation.

In summary the steps for you are:

- 1) At First Birth Visit or soon after give all new mothers the Information Sheet.
- 2) When you administer the EPDS, remind mothers of the study and ask if they would like to know more/join the study.
- 3) Fill in the attached form, and make contact with me, or wait for me to phone you.
- 4) Pass on the details to me.
- 5) Start again with new mothers, and wait for the results to be known!

In summary the steps for the mothers are:

- 1) Get the Information Sheet at the First Birth Visit or soon after.
- 2) Do the EPDS, and be reminded of the study and asked if they would like to know more/join the study.
- 3) Meet with me, to discuss the study, sign the consent form if they wish to continue, do a structured interview, and complete a questionnaire.
- 4) 16 weeks of 5 minute telephone calls to talk about their experiences of caring for their baby, and what their baby has been doing.
- 5) Meet with me once more to do a final questionnaire.
- 6) Wait for the results of the study to be known!

Once again thanks very much for your interest and help, we really would not be able to do this study without you.

The effects of Transition Periods on babies and mothers.

Researchers: Dr John Richer & Ashley Woolmore  
Contact Address: Dr John Richer  
Paediatric Psychology  
The John Radcliffe Hospital  
Headington, Oxford.  
Contact Number: (01865) 220953  
Pager Number: (0336) 773452

**Aims of the project**

This project aims to find out about the changes that happen to babies as they grow and develop. A group of researchers in Holland has discovered that babies pass through about ten 'difficult periods' during the first two years of life. These 'difficult periods' may last several weeks. They found that most babies pass through these difficult periods at about the same age. During the difficult periods babies cry more, and are harder to comfort. These difficult periods are called Transition Periods. We wish to see if we make the same findings in England.

**Why we think this is a useful project**

Looking after a new baby is very demanding, and we think that identifying the difficult times would be very useful. If we can show that all babies go through 'difficult periods' at around the same age, we can give this information to new parents. Knowing when babies will need extra care and attention has many benefits. One benefit is that it will give an explanation for why the baby seems upset. Another benefit is that parents will know when their baby is less able to cope with changes and challenges.

**We are interested in you and your baby**

We feel that it is important to not focus just on the baby. We want to talk to you to understand how your baby's changing behaviour makes you feel. We know that looking after a new baby is a demanding job, and so we have tried to make taking part in the study as simple as possible.

**What does taking part involve**

Step 1. When your Health Visitor sees you in about 4-6 weeks time she will probably give you a short questionnaire. She may ask you if she can pass on the results to Ashley Woolmore & Dr Richer. This result will, like all other answers you may give in this study, be strictly confidential.

Step 2. If you have agreed to the next step Ashley Woolmore will visit you to answer your questions about the study and ask you if you want to continue to take part. Please remember, you do not have to take part in the study. If you decide to continue with the study you can still leave at any time in the future and you don't have to give a reason. If you choose not to take part, or once started, to leave the study, this will have no effect on any future care or support for you, or your baby.

Step 3. If you decide to join the study we will go through some questions about you, your family and the birth of your baby. We will also ask you about how you have been feeling since the birth of your baby.

Step 4. This is the main part of the study. At a convenient time each week, Ashley Woolmore will telephone you to ask you how you and your baby have been getting along that week. The questions will be about the baby's feeding, its sleep and behaviour, and also about how you have been feeling. We are particularly interested in babies' development between 10 and 26 weeks. The first telephone call will be when your baby is about 10 weeks old, and the last when your baby is about 26 weeks old. Each telephone call will last between 5 and 10 minutes. When your baby is about 15 weeks old, and again when s/he is about 24 weeks old he will ask you some additional questions about how you are feeling.

Step 5. The final part of the study. Ashley Woolmore will again come and visit you at home. He will ask you about how you have found the first six months of your baby's life and, of course, thank you for taking part in the study.

We think that this is an interesting study. We would very much appreciate your participation, and we hope and believe that you will find it interesting to take part. Please remember that if you do not wish to take part, this will in no way affect any future care or support, for you or your baby.

If you are interested in taking part, please tell your Health Visitor and she will arrange for Ashley Woolmore to visit.

Thank you for taking the time to read this letter.

## Mother &amp; Baby Questionnaire

## Part A Social and Medical

## Questions for the mother

Date of Interview

Name

Address

Telephone

Contact via

D.o.B.

Place of Birth

Nationality

Ethnic Group

1. Living in current home since
2. Which language is spoken at home
3. Educational level of mother & father

a)M  
b)F

4. Profession of mother and father

a)M  
b)F

5. Living circumstances

Woman Alone  
Man & Woman  
Extended Family  
Woman & Woman  
Not Known

6. Is there a support network (are you supported by people you know and trust)?

7. Information about the family that you grew up in (questions about biological parents).

	Fathers	Mothers
Date of birth		
Schooling		
Profession		

8. How was the family that you grew up in structured?

- A complete family
- Only one parent
- Adopted
- Fostered
- Other
- In a home

9. Do you still have contact with your parents?

10. Do you have any brothers or sisters (and what order of birth)

D.o.b M/F

Note any step-siblings

11. Are there any speech problems in your family?

- Stutter
- Lisp
- Stammer
- Reading/Writing problems

12. Are there any other problems in your family. Which problems and whom?

Future Plans

12. How do you want to bring up your child; the way that you were brought up or differently?

13. What do you think is the most important thing for a baby?

14. Are you looking forward to the child or are you dreading the future with your child?

15. Were your feelings about the baby changed during pregnancy?

## Mother &amp; Baby Questionnaire

**Details of Pregnancy**

16. How was your health during the 6 months before you became pregnant?

17. How did your pregnancy go? (Prompt to get a full picture)

Undisturbed  
Sterility Treatment  
High Blood Pressure  
Amniotic Fluid Investigation  
Toxicoses Problems  
Hyperventus  
Vaginal Blood Loss  
Psychological problems  
Growth Delay  
Hereditary illness in family  
Other

18. Were you expecting a twin or multiple delivery?

19. Did you smoke, drink alcohol, drugs medication during pregnancy. How much and how often?

20. Did you have x-rays, amniocentesis or scans during the first three months of pregnancy (please write down what, how often and in which month)?

21. Not taking in to account your pregnancy, how was your health during the whole of your pregnancy?

## Mother &amp; Baby Questionnaire

**The Baby**

Name

Boy/Girl

D.o.B

Expected date of delivery

Birth weight

Birth length

30. Immediately after the birth was the baby put on to your tummy/given to you?

31. How was the condition of the child at birth? (more than one answer is possible)

No problems

meconium in amniotic fluid

Breathing problems

Asphyxia

Cyanosed

No pulse

Other

31. What was the APGAR score one minute after birth?

32. Were there postnatal problems? (more than one answer is possible)?

none

jaundiced

cyanosed

breathing problems

feeding problems

signs of giving birth early

phototherapy

incubator

other

(please ask type of treatment)

33. Have any peculiarities/abnormalities been found in your baby?

**Temperament**

34. How did the baby behave during the pregnancy?

35. Was it quiet/ Restless/ Angry/ Easily frightened/ Other/ Describe \_\_\_\_\_ baby?

36. Could you feel if the baby had a night/day system (sensitive)?



## **Weekly Interview Questions**

### **Questions about Baby**

#### **Questions about health?**

Has your baby been ill this week?

Has your baby cut a tooth this week?

Has your baby had an injection this week?

☐

#### **Questions about food**

Has your baby eaten less this week?

Has your baby shown less interest in food this week?

Has your baby been more intimate (put his/her hands on you or looked at you) during feeding this week?

#### **Sleep**

Has your baby slept less this week or have there been any changes to the sleep routine?

Has your baby had any nightmares (woken crying in the night) this week?

#### **Temperament**

Has your baby been easy going this week?

Has your baby been able to occupy him/herself this week?

Has your baby been more independent this week?

Has your baby been cheerful this week?

Has your baby been more lively this week?

Has your baby learnt new things this week?

Has your baby been interested in new things this week?

Have there been things that made your baby laugh this week?

Is there anything else that you would like to tell me that your baby has done this week?

Has your baby cried more easily or more often this week?

For what reasons do you think your baby cries?

When your baby cries, what is the thing to do?

Has your baby had mood swings more often this week?

Has your baby acted more 'babyishly' this week?

Has your baby not wanted contact with you to be broken?

Has your baby resisted being changed?

### Questions about 'attention seeking'

Has your baby acted more shyly with strangers?

Has your baby demanded to be picked up?

Has your baby demanded more contact with you this week?

Has your baby been more demanding of your attention this week?

Has your baby smiled a lot at you in particular this week?

### Other behaviours

Has your baby been more vocal this week?

Has your baby moved around less this week?

Has your baby been less active this week?

Has your baby been calmer this week?

Has your baby sucked his/her thumb/fingers more often this week?

Has your baby reached for his/her toys more often this week?

Has your baby held on to his/her toys more this week?

Has your baby been afraid of any new things this week?

## **Questions about Mothers' week**



### Mum's views on feeding

Have you fed your baby on schedule or on demand this week?

How many times per day have you fed your baby?

What have you fed your baby this week?

How did feeding stop in general this week?

Have you breast fed your baby this week?

Did you reduce the amount of breast feeding this week?

Mums' Health & Well Being

Have you felt ill this week?

Have you felt less than 100% this week?

Have you had your period this week?

Did anyone else look after your baby this week?

On a scale of one to ten how would you rate your mood this week - 0-very low  
10-bright and happy?

Mum's reactions to the baby's behaviour

Did you find your baby more tiresome this week?

Did you find your baby more easy-going this week?

Did you pick your baby up when s/he 'asked for it' this week?

Were you worried about any of the baby's behaviour this week?

Were there times this week when you wished your baby was 'out of the way'  
or 'in bed' or that you wanted more peace and quiet?

Were there times this week when your baby irritated/annoyed you?

Was this a particularly difficult week for you?

Did you feel extra tired in looking after your baby this week?

Did you do anything to relax or give yourself a change of scenery (feel less  
irritated)?

Royal College of Physicians Consent to Research Form

Title of Project: The effect of Transition Periods on babies and mothers.

Name of Responsible Investigator Dr John Richer

Psychiatric Research Ethics Committee Application Number 97/21

Have you read the Information Sheet? Yes / No

Have you had an opportunity to ask questions and discuss this study? Yes / No

Have you received satisfactory answers to all your questions? Yes / No

Have you received enough information about the study? Yes / No

Who has explained the study to you? \_\_\_\_\_

Do you understand that you are free to leave the study

- at any time
- without having to give a reason for leaving

Do you agree to take part in this study? Yes / No

Signature \_\_\_\_\_

Date \_\_\_\_\_

Name in block letters \_\_\_\_\_

Dear Dr

Your patient *Name, Date of Birth, of Address*, has agreed to take part in the research study below:

The effects of Transition Periods on babies and mothers.

The study is being carried out by Dr John Richer, Consultant Clinical Psychologist, and Mr Ashley Woolmore, Trainee Clinical Psychologist.

The aim of the study is to replicate some pioneering work undertaken in Holland on the existence of 'Transition Periods'. These are periods of difficult behaviour when the infant cries more and is difficult to settle. In full-term infants these are found to start at precise ages. We also want to determine the effect that mothers' mood might have on these difficult periods.

The study will involve your patient completing a brief section of the Clinical Interview for DSM-IV, which will be used to determine if she is suffering from post-natal depression. We will also be using a questionnaire which focuses on your patients family history, her attitudes toward her new baby, and the birth of her baby. This questionnaire is taken from the Dutch researchers' work. Your patient will be contacted weekly by telephone for approximately 16 weeks from when her baby is 10 weeks old to when s/he is 26 weeks old. At the end of this period a final questionnaire will be administered, which looks at mothering style. When the baby is 15 weeks, and again at 24 weeks your patient will be asked to complete the Edinburgh Post-natal Depression Scale.

An information sheet for participants is enclosed. This sheet includes contact numbers for the Responsible Investigators. We would be grateful if you would complete the short form below and return it in the stamped addressed envelope provided.

If we do not hear from you within two weeks we will take this to mean that you are not aware of any contraindication to your patient taking part. We would be happy to discuss the study if you would like any further information.

Thankyou for your assistance,

Yours sincerely

Ashley Woolmore  
Trainee Clinical Psychologist

Dr John Richer  
Consultant Clinical Psychologist

Letter to GPs

*Participants Name**GPs Name*The effects of Transition Periods on babies and mothers.

Please circle the appropriate response.

1. I am not aware of any reason why my patient should not participate in the study.
2. The subject should not participate in the study because

## INTERVIEW

## CLS

DIM q\$(11, 10) 'this stores the question information

DIM an(11, 10) 'this stores the responses in long

DIM q(11, 10) 'this stores how many questions per category

DIM a(11, 10) 'this stores which questions have been answered

DIM qs(11) 'this stores how many question per category

categories = 0 'this stores the number of different categories

'These are the categories

q\$(1, 0) = "Health"

q\$(2, 0) = "Food"

q\$(3, 0) = "Sleep"

q\$(4, 0) = "Positives"

q\$(5, 0) = "Diff Behav"

q\$(6, 0) = "Att Seek"

q\$(7, 0) = "Other -ve"

q\$(8, 0) = "M-Feeding"

q\$(9, 0) = "M-Health"

q\$(10, 0) = "M-Reaction"

'these are the questions for health

q\$(1, 1) = "Has your baby been ill this week"

q\$(1, 2) = "Has your baby had a new tooth this week"

q\$(1, 3) = "Has your baby had an injection this week"

'these are the questions for food

q\$(2, 1) = "Has your baby eaten less this week"

q\$(2, 2) = "Has your baby shown less interest in food this week"

q\$(2, 3) = "Has your baby been more intimate during feeding this week"

'these are the questions for sleep

q\$(3, 1) = "Has your baby slept less this week"

q\$(3, 2) = "Has your baby had any nightmares this week"

'these are questions for Positives

q\$(4, 1) = "Has your baby been easy going this week"

q\$(4, 2) = "Has your baby been able to occupy itself this week"

q\$(4, 3) = "Has your baby been more independent this week"

q\$(4, 4) = "Has your baby been cheerful this week"

q\$(4, 5) = "Has your baby been more lively this week"

q\$(4, 6) = "Has your baby learnt new things this week"

q\$(4, 7) = "Has your baby been interested in new things this week"

q\$(4, 8) = "Have their been things that made your baby laugh this week"

q\$(4, 9) = "Is there anything else that you would like to tell me that your baby has done this week"

'These are questions for difficult behaviour

q\$(5, 1) = "Has your baby cried more easily or more often this week"

q\$(5, 2) = "For what reasons do you think your baby cries"

q\$(5, 3) = "When your baby cries, what is the thing to do"

q\$(5, 4) = "Has your baby had mood swings more often this week"

q\$(5, 5) = "Has your baby acted more babyishly this week"

q\$(5, 6) = "Has your baby not wanted contact with you to be broken"

q\$(5, 7) = "Has your baby resisted being changed"

'These are questions for attention seeking

q\$(6, 1) = "Has your baby acted more shyly with strangers"

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q$(6, 2) = "Has your baby demanded to be picked up"
q$(6, 3) = "Has your baby demanded more contact with you this week"
q$(6, 4) = "Has your baby been more demanding of your attention this week"
q$(6, 5) = "Has your baby smiled at you at lot this week"

```

'These are questions for other behaviours

```

q$(7, 1) = "Has your baby been more vocal this week"
q$(7, 2) = "Has your baby moved around less this week"
q$(7, 3) = "Has your baby been less active this week"
q$(7, 4) = "Has your baby been calmer this week"
q$(7, 5) = "Has your baby sucked its thumb more often this week"
q$(7, 6) = "Has your baby baby reached for its toys more often this week"
q$(7, 7) = "Has your baby held on to its toys more this week"
q$(7, 8) = "Has your baby been afraid of any new things this week"

```

'these questions are for Mum's views on feeding

```

q$(8, 1) = "Have you fed your baby on schedule or on demand this week"
q$(8, 2) = "How many times per day have you fed your baby"
q$(8, 3) = "What have you fed your baby this week"
q$(8, 4) = "How did feeding stop in general this week"
q$(8, 5) = "Have you breast fed your baby this week"
q$(8, 6) = "Did you reduce the amount of breast feeding this week"

```

'These questions are for Mums' health

```

q$(9, 1) = "Have you felt ill this week"
q$(9, 2) = "Have you felt less than 100% this week"
q$(9, 3) = "Have you had your period this week"
q$(9, 4) = "Did anyone else look after your baby this week"
q$(9, 5) = "On a scale of one to ten how would you rate your mood this week - 0-very low 10-bright and happy"

```

'these questions are on Mum's reactions to the baby's behaviour

```

q$(10, 1) = "Did you find your baby more tiresome this week"
q$(10, 2) = "Did you find your baby more easy-going this week"
q$(10, 3) = "Did you pick your baby up when s/he 'asked for it' this week"
q$(10, 4) = "Were you worried about any of the baby's behaviour this week"
q$(10, 5) = "Were there times this week when you wished your baby was out of the way"
q$(10, 6) = "Were there times this week when your baby made you annoyed"
q$(10, 7) = "Was this a particularly difficult week for you"
q$(10, 8) = "Did you feel extra tired in looking after your baby this week"
q$(10, 9) = "Did you do anything to make your self feel less irritated this week"

```

'main body of program

```

CLS
GOSUB getname
GOSUB howmanycategories
GOSUB howmanyqs
10
GOSUB printout
GOSUB inputselection
GOSUB decisiontree
'GOSUB endroutine
GOSUB alldone
GOSUB writefile
GOSUB printout
END

```

getname:

```

PRINT "Enter file name."
PRINT "This should be initials plus week of record e.g. SW01"
LINE INPUT "?"; n$

```



RETURN

howmanycategories:

```
categories = 0
DO
categories = categories + 1
IF q$(categories, 0) = "" THEN EXIT DO
LOOP
categories = categories - 1
RETURN
```

howmanyqs:

```
FOR x = 1 TO categories
FOR y = 1 TO 10
IF q$(x, y) <> "" THEN q(x, y) = 1: qs(x) = qs(x) + 1
NEXT y
'PRINT qs(X): FOR zz = 1 TO 1000: NEXT zz
NEXT x
RETURN
```

printout:

```
'print out the categories
CLS
LOCATE 4, 6
PRINT "Categories"
LOCATE 4, 21
PRINT "Number of questions left"
LOCATE 4, 48
PRINT "Which q's answered"
PRINT
FOR x = 1 TO categories
LOCATE x + 5, 5
PRINT x; q$(x, 0) 'print out section number plus title of section
FOR y = 1 TO 10
LOCATE x + 5, 20 + y 'rearrange print out for *
IF q(x, y) = 1 THEN PRINT "*"; 'print a * if there is a question *****
NEXT y
NEXT x
FOR x = 1 TO categories
FOR y = 1 TO qs(x)
LOCATE x + 5, 44 + (y * 3)
PRINT an(x, y); 'print the number of questions answered
NEXT y
NEXT x
RETURN
```

inputselection:

```
'ask for a selection to be made
LOCATE 18, 10
INPUT "Which section"; selection
RETURN
```

decisiontree:

```
GOSUB qcontrol
RETURN
```

qcontrol:

```
CLS
"selection" tells me what section we are in
PRINT "Section on "; q$(selection, 0)
```

```

GOSUB countqs
PRINT "Number of questions in this category "; qs(selection)
FOR x = 1 TO questions
  IF a(selection, x) = 1 THEN GOTO 20
  PRINT "Question"; x; TAB(15); q$(selection, x)
30 INPUT "Huh? "; an(selection, x)
  GOSUB goback
20 NEXT x
  RETURN

```

```

countqs:
  questions = 0
  FOR x = 1 TO 10
    IF q$(selection, x) <> "" THEN questions = questions + 1
  NEXT x
  RETURN

```

```

endroutine:
  CLS
  FOR x = 1 TO 10
    FOR y = 1 TO 10
      LOCATE (x + 2), (y + 2) * 3
      PRINT q(x, y);
    NEXT y
  NEXT x
  RETURN

```

```

goback:
  IF an(selection, x) = 999 THEN
    PRINT "GO BACK": GOTO 10
  ELSEIF an(selection, x) = 0 THEN
    GOTO 30
  ELSE q(selection, x) = 0: a(selection, x) = 1
  END IF
  RETURN

```

```

writefile:
  OPEN n$ FOR OUTPUT AS #1
  FOR x = 1 TO 11
    FOR y = 1 TO qs(x)
      WRITE #1, x, y, an(x, y)
    NEXT y
  NEXT x
  CLOSE
  RETURN

```

```

alldone:
  FOR x = 1 TO 10
    FOR y = 1 TO 10
      IF q(x, y) <> 0 THEN GOTO 10
    NEXT y
  NEXT x
  RETURN

```

Ashley Woolmore  
 Paediatric Psychology  
 John Radcliffe Hospital  
 HEADINGTON  
 Oxford  
 18<sup>th</sup> March 1998

Dear

Re: The effect of Transition Periods on babies and mothers.

I am writing to let you know that the first stage of the research project has been a great success. We have the number of participants that we hoped for: 30 families in the control group; 15 families where the mother has some degree of post-natal depression.

Thanks very much indeed for all your work.

The early results of the project are very encouraging; there is good agreement with the Dutch study, and there appear to be some interesting effects of post-natal depression.

John Richer and I would like to arrange a lunchtime get-together, where we could present the results of the findings to you and thank you properly for all your help. The last families leave the project in June, and the project has to be submitted in the middle of July. So if we could arrange the lunch for the first week in July, I could incorporate any of your comments into the final submission. I'll let you know the date of the lunch in the next few weeks.

At the last forum meeting, I asked if it would be possible to collect some information about new births. What we would like to know is how many new deliveries were referred to you during the time the study was running. I have attached a sheet, and a reply envelope for you to post the figures back to me. I have also enclosed a list of participants for whom I don't have EPDS scores. I would be very grateful if you could provide these. If you have any queries please contact me on (01865) 881 771.

Many thanks for all your help,

Ashley Woolmore

# CONVERT

```

GOSUB setup
GOSUB getdata
GOSUB gate
GOSUB decision
GOSUB scanner
GOSUB score
END

```

setup:

```

DIM data$(60)
gate = 0
tp = 0
cry = 0
attn = 0
mumstuff = 0
mumstuff1 = 0
food = 0
sleeps = 0
change = 0
baby = 0
fear = 0
vocal = 0
active = 0
CLS
RETURN

```

getdata:

```

INPUT "Which file"; n$
OPEN n$ FOR INPUT AS #1
DO
counter = counter + 1
INPUT #1, x, y, data$(counter)
LOOP UNTIL (EOF(1))
RETURN

```

gate:

```

'crying and mood swings
IF data$(18) = "1" THEN cry = cry + 1
IF data$(21) = "1" THEN cry = cry + 1
'attention and proximity regulating
IF data$(6) = "1" THEN attn = attn + 1
IF data$(23) = "1" THEN attn = attn + 1
IF data$(26) = "1" THEN attn = attn + 1
IF data$(27) = "1" THEN attn = attn + 1
IF data$(28) = "1" THEN attn = attn + 1
'mum's impression of week
IF data$(49) = "1" THEN mumstuff1 = mumstuff1 + 1
IF data$(53) = "1" THEN mumstuff = mumstuff + 1
IF data$(54) = "1" THEN mumstuff = mumstuff + 1
IF data$(55) = "1" THEN mumstuff = mumstuff + 1
RETURN

```

decision:

```

PRINT cry; "crying questions answered positively (0-2)"
PRINT attn; "attention questions answered positively (0-5)"
PRINT "Tiresome "; mumstuff1

```

```

PRINT "Difficult Week "; mumstuff
IF cry > 0 AND attn > 0 THEN
  RETURN
ELSE
  GOSUB closure
END IF

```

closure:

```

PRINT "This was not a TP"
DO
  LOOP WHILE INKEY$ = ""
RETURN

```

scanner:

```

FOR x = 1 TO 58
  SELECT CASE x
    CASE 4, 5
      GOSUB feeding

    CASE 7, 8
      GOSUB sleeping

    CASE 24
      GOSUB changing

    CASE 22, 34
      GOSUB babying

    CASE 25, 37
      GOSUB fearing

    CASE 30
      GOSUB talking

    CASE 31, 32
      GOSUB activity

  END SELECT
NEXT x
DO
  LOOP WHILE INKEY$ = ""
RETURN

```

score:

```

PRINT
PRINT

PRINT "Food score"; food
PRINT "Sleep score "; sleeps
PRINT "Change score "; change
PRINT "Babyish score "; baby
PRINT "Fearful score "; fear
PRINT "Vocalisation score"; vocal
PRINT "Activity Score"; active
PRINT
score = score + food + sleeps + change + baby + fear + vocal + active + cry + attn
PRINT "Overall score ="; score
CLOSE
DO

```

```
LOOP WHILE INKEY$ = ""  
RUN
```

feeding:

```
IF data$(x) = "1" THEN food = food + 1  
RETURN
```

sleeping:

```
IF data$(x) = "1" THEN sleeps = sleeps + 1  
RETURN
```

changing:

```
IF data$(x) = "1" THEN change = change + 1  
RETURN
```

babying:

```
IF data$(x) = "1" THEN baby = baby + 1  
RETURN
```

fearing:

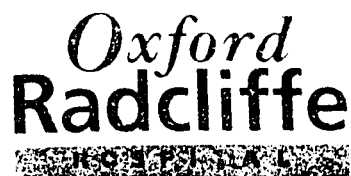
```
IF data$(x) = "1" THEN fear = fear + 1  
RETURN
```

talking:

```
IF data$(x) <> "1" THEN vocal = vocal + 1  
RETURN
```

activity:

```
IF data$(x) = "1" THEN active = active + 1  
RETURN
```



OXFORDSHIRE PSYCHIATRIC RESEARCH  
ETHICS COMMITTEE

Manor House  
Headley Way, Headington  
Oxford OX3 9DZ

Tel: 01865 222692/222547  
Fax: 01865 222699

Our Ref. DG/OB

16 July, 1997

Dr John Richer  
Paediatric Psychology  
Level 2  
John Radcliffe Hospital  
Oxford

Dear Dr Richer

re: OPREC 97/21 - The effects of Transition Periods on babies and mothers

Your study was reviewed at the OPREC meeting on 15 July 1997 and ethics approval was granted subject to the following condition:

1. The information sheet should make it plain that the mother or babies' care will not be affected in the future if the mother chooses not to take part in the study.

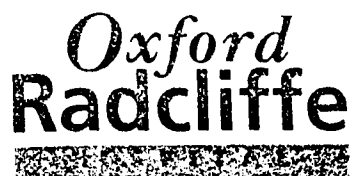
Best Wishes

Yours sincerely

A handwritten signature in black ink, appearing to be "DM" followed by a long horizontal stroke.

Dr David Geaney  
Chairperson  
Oxfordshire Psychiatric Research Ethics Committee

**Chairman: Dr D. Geaney**



OXFORDSHIRE PSYCHIATRIC RESEARCH  
ETHICS COMMITTEE

Manor House  
Headley Way, Headington  
Oxford OX3 9DZ

Tel: 01865 222692/222547  
Fax: 01865 222699

Our Ref. DG/JH/97.21

26 August, 1997

Dr John Richer  
Paediatric Psychology  
The John Radcliffe Hospital

Dear Dr Richer

**Re: OPREC 97.21 - the effects of transition periods on babies and mothers**

We have now received the letter of indemnity from the Oxford Radcliffe NHS Trust and are happy to give final approval to your study.

Yours sincerely

A handwritten signature in cursive script that reads "David Mackintosh".

 Dr David Geaney  
Chairperson  
Oxfordshire Psychiatric Research Ethics Committee

**Chairperson: Dr D. Geaney**



## Calculations for mothers' education

Level of Education	Calculation	Length of Education
School	11 years	11 years
College	11+2 years	13 years
A Levels	11+2 years	13 years
Degree	11+2+3 years	16 years
MSc	11+2+3+1 years	17 years
MD	11+2+5 years	18 years
PhD	11+2+3+3 years	19 years

Summary statistics for variations in the percentage of Regression Weeks-M over the course of the study. Data is presented from both data sets, and for the PND and control groups.

Weeks of the study – from 12 to 26 weeks postpartum																	
Variables	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total	
Regression Weeks-M	4 <sup>a</sup>	3	4	6	6	11	4	4	7	5	4	6	9	4	6	83	
Uncorrected PND Group (n=15)	10 <sup>b</sup>	10	13	14	15	15	11	13	15	15	15	15	15	14	15	205	
	0.40 <sup>c</sup>	0.30	0.31	0.43	0.40	0.73	0.36	0.31	0.47	0.33	0.27	0.40	0.60	0.29	0.40		
	0.00 <sup>d</sup>	-0.65	-0.68	0.22	0.00	2.64	-0.25	-0.68	0.53	-0.53	-1.05	0.00	1.58	-0.87	0.00		
Regression Weeks-M	4	5	8	6	15	7	7	9	14	8	13	14	11	10	9	140	
Uncorrected Control Group (n=31)	25	30	30	30	30	30	30	30	30	26	29	31	30	30	28	439	
	0.16	0.17	0.27	0.20	0.50	0.23	0.23	0.30	0.47	0.31	0.45	0.45	0.37	0.33	0.32		
	-1.71	-1.79	-0.62	-1.40	2.10	-1.01	-1.01	-0.23	1.71	-0.13	1.47	1.56	0.54	0.16	0.02		
Regression Weeks-M	4	3	3	5	6	10	3	4	6	3	2	6	4	4	3	66	
Corrected PND Group (n=15)	10	10	13	14	15	15	11	13	15	15	15	15	15	14	15	205	
	0.40	0.30	0.23	0.36	0.40	0.67	0.27	0.31	0.40	0.20	0.13	0.40	0.27	0.29	0.20		
	0.54	-0.13	-0.69	0.30	0.66	2.86	-0.33	-0.09	0.66	-0.99	-1.54	0.66	-0.44	-0.27	-0.99		
Regression Weeks-M	4	4	8	4	12	4	6	8	13	5	9	9	9	8	9	112	
Corrected Control Group (n=31)	25	30	30	30	30	30	30	30	30	26	29	31	30	30	28	439	
	0.16	0.13	0.27	0.13	0.40	0.13	0.20	0.27	0.43	0.19	0.31	0.29	0.30	0.27	0.32		
	-1.15	-1.59	0.08	-1.59	1.76	-1.59	-0.75	0.08	2.18	-0.79	0.62	0.39	0.50	0.08	0.75		

Table Format: <sup>a</sup>Number of participants reporting a Regression Week-M.  
<sup>b</sup>Number of participants in the study.  
<sup>c</sup>Proportion of participants reporting Regression Week-M.  
<sup>d</sup>Calculated Z-score from Z-test of proportions

Summary statistics for variations in the percentage of Regression Weeks-IB over the course of the study. Data is presented from both data sets, and for the PND and control groups.

		Weeks of the study – from 12 to 26 weeks postpartum																										
Variables	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total												
Regression Weeks-IB	4 <sup>a</sup>	5	9	10	7	10	5	3	4	5	4	7	11	8	5	97												
Uncorrected PND Group (n=15)	10 <sup>b</sup>	10	13	14	15	15	11	13	15	15	15	15	15	14	15	205												
	0.40 <sup>c</sup>	0.50	0.69	0.71	0.47	0.67	0.45	0.23	0.27	0.33	0.27	0.47	0.73	0.57	0.33													
	-0.44 <sup>d</sup>	0.19	1.60	1.83	-0.03	1.52	-0.10	-1.73	-1.58	-1.06	-1.58	-0.03	2.04	0.76	-1.06													
Regression Weeks-IB	9	13	13	10	14	7	8	10	15	9	10	12	13	11	12	166												
Uncorrected Control Group (n=31)	25	30	30	30	30	30	30	30	30	26	29	31	30	30	28	439												
	0.36	0.43	0.43	0.33	0.47	0.23	0.27	0.33	0.50	0.35	0.34	0.39	0.43	0.37	0.43													
	-0.20	0.60	0.60	-0.52	0.97	-1.64	-1.27	-0.52	1.34	-0.35	-0.39	0.08	0.60	-0.15	0.52													
Regression Weeks-IB	2	2	8	9	6	10	4	6	3	3	4	5	2	8	3	75												
Corrected PND Group (n=15)	10	10	13	14	15	15	11	13	15	15	15	15	15	14	15	205												
	0.20	0.20	0.62	0.64	0.40	0.67	0.36	0.46	0.20	0.20	0.27	0.33	0.13	0.57	0.20													
	-1.12	-1.12	1.84	2.13	0.24	2.40	-0.04	0.69	-1.37	-1.37	-0.83	-0.30	-1.91	1.57	-1.37													
Regression Weeks-IB	12	10	12	6	12	4	6	9	12	3	4	7	13	8	4	122												
Corrected Control Group (n=31)	25	30	30	30	30	30	30	30	30	26	29	31	30	30	28	439												
	0.48	0.33	0.40	0.20	0.40	0.13	0.20	0.30	0.40	0.12	0.14	0.23	0.43	0.27	0.14													
	2.24	0.65	1.47	-0.98	1.47	-1.80	-0.98	0.24	1.47	-1.88	-1.71	-0.67	1.88	-0.16	-1.62													

Table Format: <sup>a</sup>Number of participants reporting a Regression Week-IB.  
<sup>b</sup>Number of participants in the study.  
<sup>c</sup>Proportion of participants reporting Regression Week-IB.  
<sup>d</sup>Calculated Z-score from Z-test of proportions.

Formula for the Z-test of proportions

$$Z = \frac{(\text{Observed Proportion} - \text{Expected Proportion})}{\sqrt{\frac{\text{Expected Proportion} \times (1 - \text{Expected Proportion})}{\text{Number in Observed Proportion}}}}$$

## Facilitators & Regulators Questionnaire

**Question 1** Do/did you have a routine?

If yes, when did it begin, and how was it structured

**Question 2** Was/is the baby breast-fed? If yes, for how long?

Did/do you breast/bottle feed by demand or schedule?

When were solids introduced? Are these combined with breast/bottle feeds?

When did you/do you intend to wean the baby?

**Question 3** When did you experience the baby trying to communicate with you?  
NB – baby's intentional efforts at communication

**Question 4** Which best describes your feelings at the time:

During the first few weeks – my baby seemed still merged with me

During the first few weeks – my baby seemed an outgoing sociable person

During the first few weeks – my baby seemed separate but not yet sociable

**Question 5** How would you describe your interaction with your baby?

I adapt to my baby

We negotiate between us

The baby adapts to the household routine